TC 23-24

DEPARTMENT OF THE ARMY TRAINING CIRCULAR

DRAGON MEDIUM ANTITANK
ASSAULT WEAPON SYSTEM M47

HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1974

WARNING: THE GUIDANCE WIRES FROM A DRAGON MISSILE PRESENT A POTENTIAL HAZARD TO PERSONNEL WHEN SUSPENDED FROM TREES, BUSHES OR SIMILAR OBJECTS DUE TO THEIR SMALL DIAMETER AND HIGH STRENGTH. ACCESS TO AREAS WHERE SUCH CONDITIONS MAY EXIST SHOULD BE STRICTLY CONTROLLED. WHEN SUSPENDED WIRES ARE FOUND, THEY SHOULD BE REMOVED.

WARNING: INFRARED (IR) RADIATION IS EMITTED BY THE TARGET SOURCE. SERIOUS EYE BURN CAN RESULT IF THE TARGET SOURCE IS VIEWED DIRECTLY WHILE IN AN OPERATING MODE.

TRAINING CIRCULAR
No. 23-24

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *30 August 1974*

DRAGON MEDIUM ANTITANK ASSAULT WEAPON SYSTEM M47

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Purpose and Scope. *a.* This training circular is a guide for the training of infantry antiarmor teams with the M47 Dragon weapon system. Modifications to the training may be necessary due to factors such as time, personnel, facilities, and the ammunition available to the using unit. When it is possible, the suggestions, tables, and procedures which are described herein should be followed.

b. This training circular covers the description, assembly, function, operating procedures, ammunition, maintenance, technique of fire, and marksmanship training for the M47 Dragon weapon system and the training equipment, and basic considerations for tactical employment.

1-2. Recommended Changes and Comments. Users of this publication are encouraged to submit recommended changes or comments for its improvement. Comments should be keyed to the specific page, paragraph, and line of text in which the change is recommended. Reasons will be given for each comment to insure its understanding and complete evaluation. **Comments should be** prepared using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and **forwarded direct to the Commandant, US Army Infantry School, ATTN: ATSH-I-V-D, Fort Benning, Georgia 31905.**

Section II. DESCRIPTION

1-3. Characteristics. *a. General.* The M47 Dragon is a command to line of sight guided missile system which is a man-portable, shoulder-fired, medium antitank weapon (MAW) (fig 1-1). The missile is launched from a smooth bore, fiberglas tube, recoilless launcher. The missile is automatically and continuously guided along the gunner's line of sight by a sensor device which tracks the missile's course and transmits correcting signals via a wire link. The Dragon consists of two major components, the tracker and the round. The round is the expendable part of the system. It also has two major parts, the launcher and the missile, which are packaged together at the factory for handling and shipping (fig 1-2). The launcher serves as the handling and carrying container and for firing the missile. The tracker (fig 2-2) is the reusable part of the system. It is designed for fast, easy detachment from the round. The tracker determines any deviation of the missile from the line of sight and generates correcting signals, which are transmitted to the missile control system by means of the wire link. The Dragon can be employed in all weather conditions and in any type of terrain. The Dragon is organic to the infantry company and will be employed at the platoon level of operation. It will replace the 90-mm recoilless rifle, and provide the dismounted or mounted soldier with a defense against hostile armor in both day and night. The Dragon is equally effective in the assault role against field fortifications, heavy weapon emplacements, and other hard point targets. With its light weight, rapid deployment, and ease of operation, it is particulary suited for airborne and airmobile operations as well as in situations where the terrain is difficult for wheeled or tracked vehicles.

Figure 1-1. M47 Dragon.

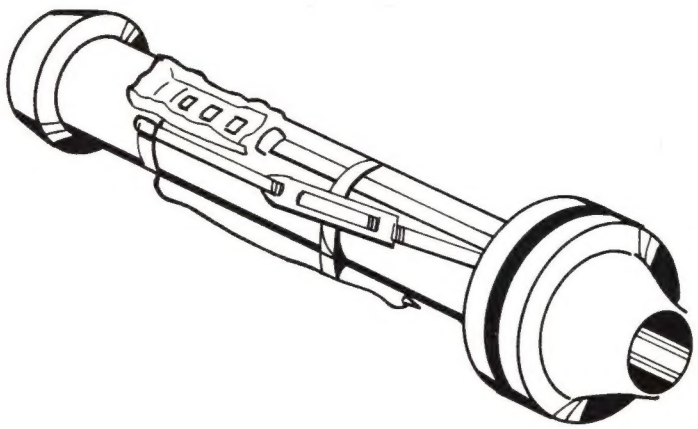


Figure 1-2. Round.

b. Tracking and Control Capabilities. The automatic command to line of sight guidance system of the Dragon provides a high first round hit probability. Deployment begins when a gunner anticipates a target and gets in an appropriate firing position. He acquires the target in the tracker sight and sets and holds the sight crosshairs on the target, thus providing a continuous line of sight for the tracker. No other gunner control is required since the guidance and control is automatic until the missile impacts on the target. The gunner does not apply leads, windage, or elevation. The gunner quickly detaches the tracker, disposes of the expended round launcher), and is ready to fire another round.

c. Data.

(1) *General data.*

(*a*) Minimum range . . . . . 65 meters.

(*b*) Maximum range . . . . . 1000 meters.

(*c*) Ammunition—High Explosive Antitank Missile.

(*d*) Team . . . . . Two men.

(2) *Specific data.*

	Weight kg (*lbs*)	*Length* cm (*in*)	*Width* cm (*in*)	*Height* cm (*in*)	*Diameter* cm (*in*)
ROUND	11.4 (25.29)	112 (44.10)	....	....	25.4 (10.0)
Bipod extended, forward shock absorber removed	10.9 (24.3)	102 (40.0)	....	Max 129 Min 96.5 (Max 51.0) (Min 38.0)	....
Same as above with tracker mated	13.9 (30.87)	102 (40.0)	....	Max 129 Min 96.5 (Max 51.0) (Min 38.0)	....
Post missile launch	7.2 (16.07)				
TRACKER	3.9 (6.58)	34.6 (13.63)	24.1 (9.50)	15.2 (6.0)	....
Tracker carrying bag	.7 (1.56)	25.4 (10.0)	15.2 (6.0)	33 (13.0)	

1-4. Dragon Training Equipment. *a.* The Dragon training equipment is a team-portable trainer which was developed for use with the Dragon. The training equipment may be used in any simulated tactical operation and will operate in all weather conditions in which the gunner can see the target. The training equipment is used for Dragon gunner tracking instruction, practice, and qualification.

b. The Dragon training equipment consists of a launch effects trainer, infrared transmitter, field handling trainer, and monitoring set. The tactical tracker is used with the training equipment (fig. 1-3).

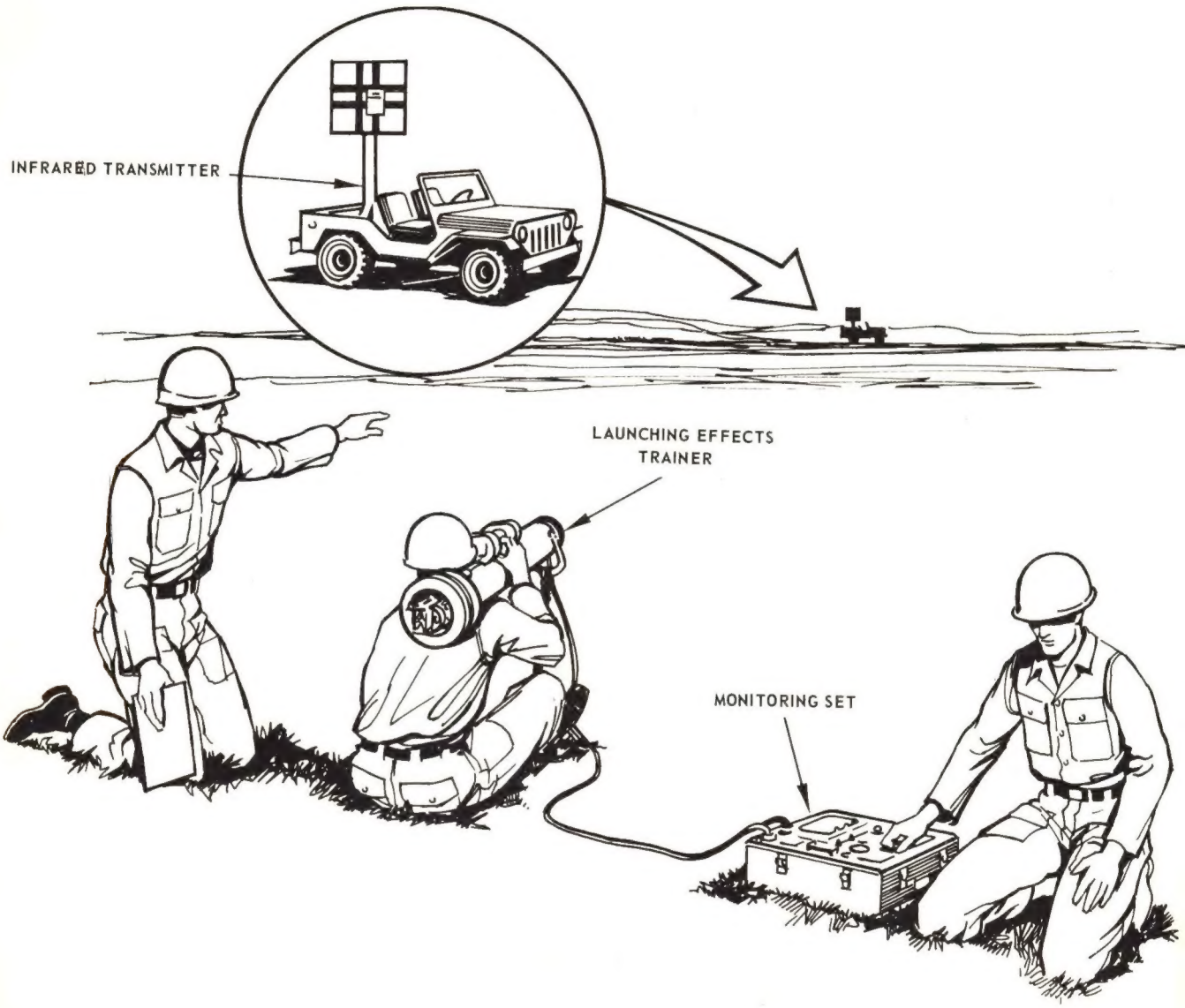


Figure 1-3. Dragon training equipment.

Table 1-1. Dragon Training Equipment Data

	Weight kg (lbs)	*Length cm (in)*	*Width cm (in)*	*Height cm (in)*
Launch Effects Trainer	12.6 (28.0)	111.8 (44.0)	....	....
Monitoring Set	40.0 (89.0)	50.8 (20.0)	58.4 (23.0)	35.6 (14.0)
Infrared Transmitter	6.2 ((13.75)	34.3 (13.5)	25.1 (9.90)	20.7 (8.15)
Power Supply Modulator	20.2 (45.0)	43.2 (17.0)	40.6 (16.0)	25.4 (10.0)
Target Board	9.4 (21.0)	111.8 (44.0)	111.8 (44.0)	....
Target Source Cable	....	365.8 approx (144.) approx	....	....
Power Supply Modulator Cable	....	304.8 approx (120.) approx		....
Universal Adapter Plate	....	73.7 (29.0)	55.9 (22.0)	....
Pedestal Assembly	1.2 (27)	33 (13)	38.1 (15)	68.6 (27)

1-5. Target Engagement. To engage a target, the Dragon gunner acquires the target and determines if it is within range. When the target is within range, the gunner alines the crosshairs of the tracker on the target, launches the missile, and tracks the target until the missile impacts (fig. 1-4). The infrared cell and receiver assembly in the tracker receive a signal from the infrared flare in the aft end of the missile. The tracker electronics will compare the missile position with the gunner's line of sight. Any difference in this comparison will be sent from the tracker to the control signal's computer in the aft end of the missile through the command link wire, which is dispensed from the in-flight missile. The control signal's computer interprets these differences and produces correction commands for rocket motor firings. The rocket motors fire as commanded, in pairs, to correct the missile's position to the gunner's line of sight and provide forward thrust. Upon contact with the target a shaped warhead is detonated.

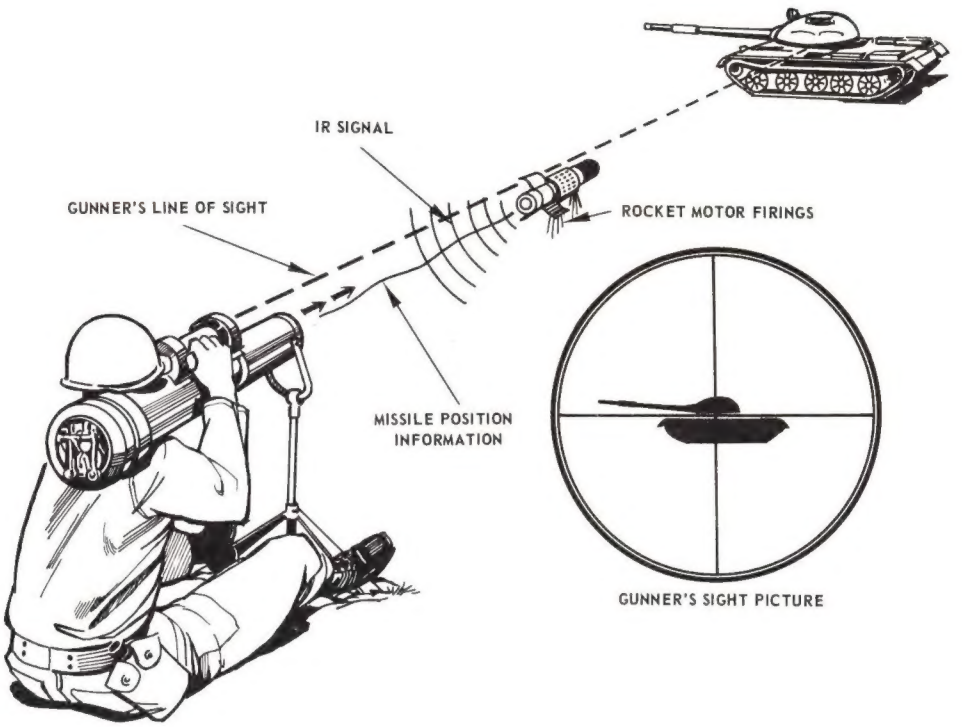


Figure 1-4. Dragon functioning concept.

CHAPTER 2

THE COMPONENTS OF THE WEAPONS SYSTEM

2-1. Detailed Description. The M47 Dragon weapon system has two main parts, a tracker and a round (fig. 2-1). The following paragraphs will describe the components of each part.

a. Tracker. The tracker (fig. 2-2) consists of an aluminum housing assembly which contains an optical sight and a receiver assembly. On the right side of the housing is a firing mechanism which consists of a trigger safety plunger and trigger lever. The firing mechanism is protected by a dust/moisture sealed boot. The control signals comparator (tracker electronics) is located on the underside of the tracker and is protected by an access cover. The electrical connector which connects the tracker to the round is located on the bottom rearward portion of the tracker housing. A cover which provides both mechanical and moisture protection for the electrical connector is attached by a lanyard to the tracker. Shock absorbers surround the forward and aft ends of the tracker to protect the tracker if it is dropped. A transparent, plastic lens cover is provided to protect the receiver lens and optical lens and is also attached to the tracker by a lanyard.

(1) The optical sight is a six-power telescope with a six-degree field of view, and has an objective lens and a sight reticle with stadia lines and crosshairs (fig. 2-3). The stadia lines aid the gunner in determining if the target is with range (1000 meters), and the crosshairs aid the gunner in establishing and holding point of aim. The optical sight has an adjustable eyepiece to focus the sight lens to the gunner's eye. The sight eyeguard aids in orienting the gunner's eye to the sight, and it reduces lingt interference. It also serves as a cushion to protect the gunner's eye against the slight weapon recoil during missile launch.

(2) The infrared cell and receiver consists of a lens, a mirror, filter, and infrared detector. The lens focuses the infrared energy radiated form the missile flare onto the mirror. The mirror reflects the energy through the filter and distributes it onto the infrared detector. The detector then provides the tracker electronics with information on the position of the missile.

(3) The control signals comparator (tracker electronics) is a printed circuit board which converts the missile position information received from the detector to electrical impulses which are sent to the missile. The trackers electronics and infrared detector receive their operating power from the tracker battery, located on the round, through electrical contacts on the rear of the tracker support assembly.

(4 The firing mechanism is a generator which produces an electrical impulse to initiate the weapon firing sequence. The safety plunger must be depressed before the trigger lever can be activated.

(5) The tracker carrying bag is used to carry the tracker (fig. 2-4). The bag is nylon and has a velcor fastener on the flap. It also has an adjustable sling assembly. Foam padding on one side of the bag protects the tracker firing mechanism. A cleaning kit (lens tissue and alcohol bottle) is in a small compartment inside the carrying bag.

b. Round. The round consists of the launcher and missile (fig. 2-5). The missile is mechanically held in place in the launcher by three shear screws.

(1) *Launcher.* The launcher consists of a smooth bore, filament-wound fiberglas tube, breech and gas pressure generator assembly, launcher wiring harness, tracker battery, tracker support assembly, bipod, forward and aft shock absorbers, and the launcher sling assembly.

(a) The tracker battery is activated during the launch sequence by the missile battery. It is a thermal, one-shot battery that activates the missile gyro and furnishes power to the tracker. It is located on the top of the launcher just forward of the breech.

(b) The tracker support assembly provides a means of rapidly attaching the tracker to the launcher (fig 2-6). A sliding contact electrical connector is built into the aft end of the tracker support assembly and mates with the tracker electrical contacts to provide all electrical connections required for the weapon system. A tracker retaining clip, on the rear left side of the tracker support assembly, locks the tracker into position. The tracker support assembly is located on the top forward portion of the launcher.

(c) The breech and gas pressure generator assembly generates and controls the gas pressure used to propel the missile from the launch tube. It also minimizes launch recoil, and establishes a muzzle velocity for the missile.

(d) The bipod is attached to the forward end of the launcher to assist the gunner in maintaining a

steady track of the target. When in the extended position, the height and level of the bipod are adjustable to adapt the weapon to the gunner and terrain (fig 2-7). When retracted, it folds against the launcher and locks the forward shock absorber in place. The bipod is held in its retracted position by a quick-release strap.

(e) The forward shock absorber seals and protects the forward end of the round and is removed before firing the weapon (fig 2-8). It has a view port to check the desiccant by means of a humidity indicator in the face of the shock absorber.

(f) The aft shock absorber seals and protects the aft end of the round, and is not removed before firing the weapon. The shock absorber will shear off during the missile launch.

(g) The launcher sling assembly is an adjustable web strap which allows the gunner to carry the weapon in various positions (fig 2-9).

(2) *Missile.* The missile has three sections (fig 2-10). The warhead section contains the explosive shaped charge and fuse system; the center section contains the rocket motors and firing circuit boards; and the aft section contains the missile battery,

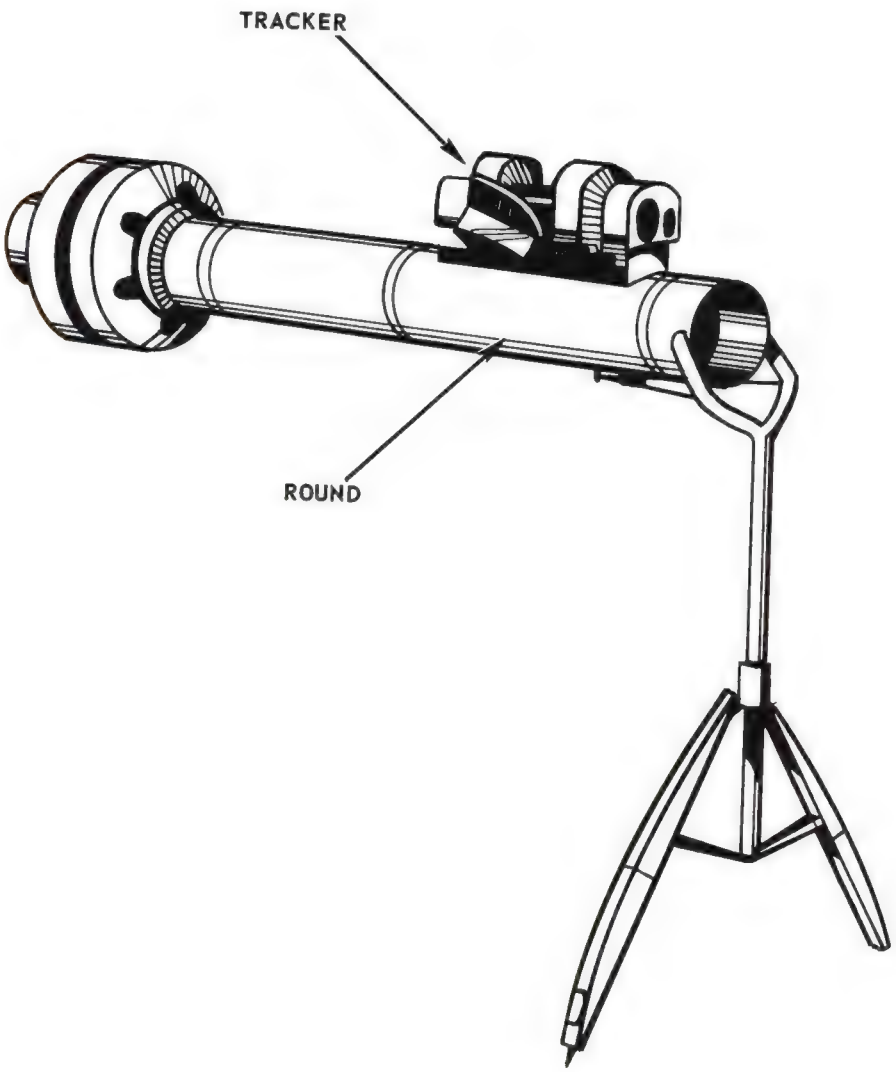


Figure 2-1. Dragon weapon system.

displacement gyro, control signals computer (missile electronics), infrared flare, command link wire and bobbin assembly, and fin assembly. There are two types of missiles. The missiles are identical with the exception of the warhead. The guided missile and launcher surface attack, M222, contains a high explosive, antitank (HEAT), shaped charge warhead; and guided missile launcher surface attack practice, M223, contains an inert warhead.

(a) *Warhead section.* The warhead section contains the fusing system which consists of the nose crush switch and the safety and arming device (fig 2-11).

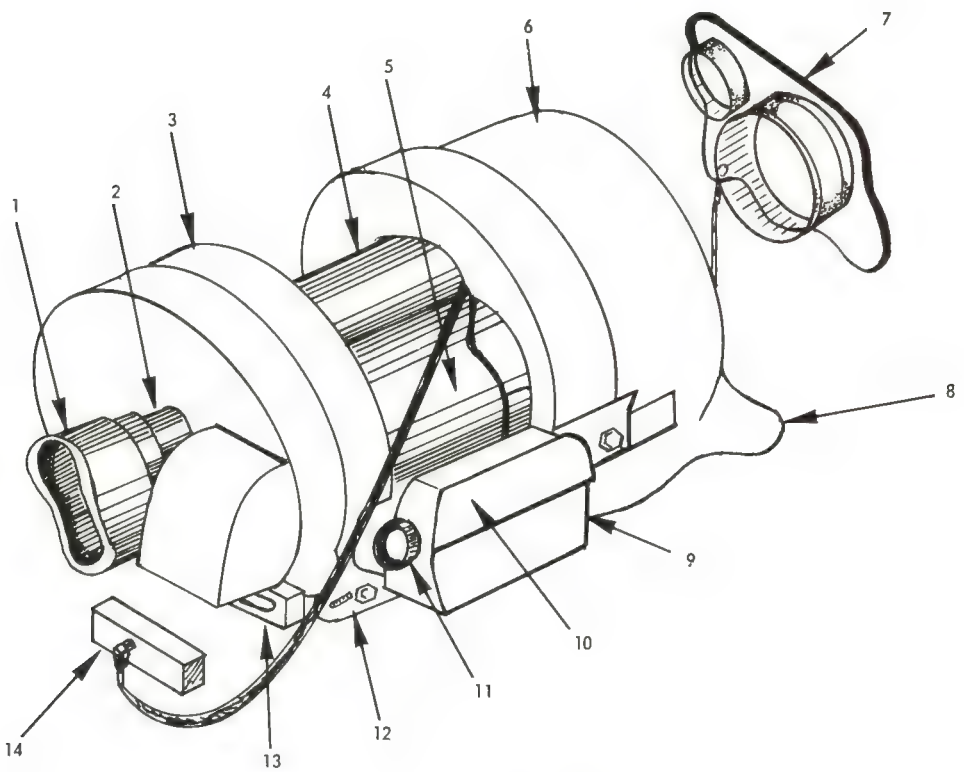
1. The nose crush switch forms the forward end or ogive of the warhead. It consists of an outer and inner shell which are insulated from each other. Contact with a solid object will cause the outer shell to make contact with the inner shell. When the two shells make contact, the warhead is detonated by the safety and arming device.

2. The safety and arming device is connected to the base of the warhead and requires electrical energy and missile acceleration to arm.

(b) *Center section.* The center section contains three segments with each segment providing mounts for 20 rocket motors. Each segment has two rocket motor firing boards which are electrically connected to the rocket motors (fig 2-12).

1. The rocket motors provide thrust to sustain missile flight to the maximum range and power to control the flight path of the missile. These are fired in pairs and are located so that a driving force will be applied equally forward and aft of the missile center of gravity.

2. The six firing circuit boards in each



1. EYEGUARD
2. SIGHT ADJUSTMENT
3. AFT SHOCK ABSORBER
4. OPTICAL SIGHT ASSEMBLY
5. INFRARED RECEIVER ASSEMBLY
6. FORWARD SHOCK ABSORBER
7. LENS COVER
8. LANYARD
9. FIRING MECHANISM
10. TRIGGER LEVER/BOOT
11. TRIGGER SAFETY PLUNGER/BOOT
12. GUIDE PIN (4 EACH)
13. ELECTRICAL CONNECTOR
14. PROTECTIVE COVER W/LANYARD

Figure 2-2. Tracker.

missile provide the electrical connections between the rocket motors and the control system electronics.

(c) *Aft section.* The aft section houses the missile battery, gyro, control signals computer, infrared flare, command link wire and bobbin assembly, and fin assembly (fig 2-13).

1. The thermal missile battery is activated by an electrical impulse from the trigger when it is depressed. It provides the electrical power for all missile components and the electrical power to activate the tracker battery and gas pressure generator.

2. The gas-driven, free gyro provides roll information to the control signals computer and is referenced to its prelaunch position in the launcher.

3. The control signals computer package is mounted inside the command link wire and bobbin assembly. It converts missile position signals from the tracker into firing signals for the rocket motors.

4. The flare assembly (infrared source) identifies the position of the missile for the tracker.

5. The command link wire and bobbin assembly consists of the command link wire wound around a bobbin sleeve. One end of the wire is connected to the launcher/tracker electronics and the other end is connected to the missile control signals computer.

6. The fin and sleeve assembly is attached to the aft section. While the missile is in the launch tube, the fins are folded against the missile aft section and extend and lock once the missile leaves the launcher. The fins are formed with a two-degree cant which causes the missile to roll at approximately five revolutions per second during missile flight.

2-2. Dragon Training Equipment. The Dragon training equipment consists of a launch effects traner (LET), monitoring set, field handling trainer, and an infrared transmitter.

a. The LET provides a capability for training Dragon gunners at much less cost than the use of the Dragon round. The LET closely simulates the launch of the Dragon to the gunner. Its explosive power is provided by the M64 grenade cartridge. The explosive power of the grenade cartridge drives the dummy weight (fig 2-15) forward in the pressure tube (G, fig 2-16), simulating weight loss and recoil. This cartridge is relatively safe and easy to store. Since no high explosives are used and no projectile is launched, restrictions upon the training area are greatly reduced. In addition, when used in conjunction with other Dragon training equipment, the gunner's performance can be evaluated not only with regard to whether he scored a "hit" or a "miss" but at what point(s) during the tracking run his performance was less than acceptable. Also, the direction his aim was off is indicated, i.e., left, right, up, or down. Dragon gunners will receive most of their training using the LET.

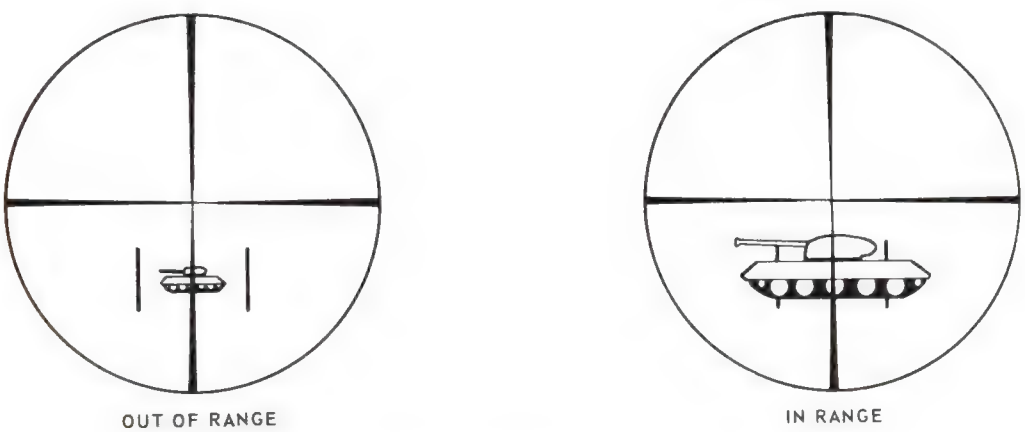


Figure 2-3. Sight reticle.

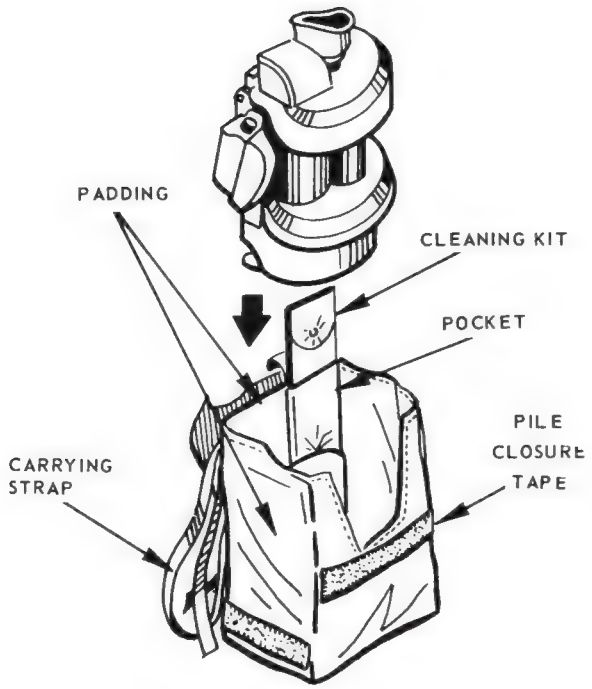


Figure 2-4. Tracker carrying bag.

(1) The LET subassembly consists of a fiberglas uncher tube with various components attached.

(a) The trainer/monitoring set interconnect ectrical connector which provides the means for onnecting the monitoring set to the LET (fig 2-15).

(b) The breech assembly consists of the reechblock, breechblock release lever, hammer ring pin, arming lever, cartridge extractor, and artridge chamber. In the closed position, the reechblock closes the cartridge chamber. When the reechblock release lever is placed in the disengaged osition, it engages the arming lever and releases the reechblock for opening. When the breechblock is pened, it cocks the firing mechanism, resets the me delay mechanism, and positions the cartridge or manual removal.

(c) The subassembly also contains the battery ubes which house 16 BA30 batteries that supply the ecessary energy for firing the LET.

(2) The tracker support is identical in configuration to the one on the tactical round. The tactical tracker is used with the LET.

(3) The forward and the aft shock absorbers, and the aft closure end cap are constructed of a resilient material and are shaped to prevent damage to the forward and aft ends of the LET (fig 2-14). Removal of the forward shock absorber permits access to the trainer/monitoring set interconnect electrical connector (fig 2-15). The aft closure end cap is removable to permit access to the breechblock assembly (C, fig 2-16). The forward shock absorber and aft closure end cap are removed prior to firing the LET (A, fig 2-16).

(4) The bipod has a 90° traverse for the tracking of moving targets (fig. 2-4). The bipod is spring centered and incorporates height and leveling adjustment devices.

(5) The dummy tracker battery (fig 2-14) is located on the top of the launch tube just forward of the aft shock absorber.

(6) The sling is an adjustable web-strap, attached near the forward and aft ends of the launcher tube, and is used to carry the LET.

b. The monitoring set (fig 2-17) monitors and evaluates the tracking performance of the Dragon gunner. It is powered by self-contained, rechargeable, nickel cadmium batteries. The monitoring set housing contains the monitoring set control and display pannel for training set and battery charging operations, and the electrical cables necessary to operate and recharge the monitoring set. The monitoring set control and display panel consists of the following:

(1) *Battery charging section.* (fig 2-18).

(a) The METER SELECTOR is a four-position switch which enables the operator to monitor the positive battery voltage, negative battery voltage, or the charging current.

(b) A voltmeter permits the operator to check the battery voltage and charging current.

1. Battery voltages are indicated on the meter top scale when the meter selector switch is placed in the POSITIVE VOLTS or NEGATIVE VOLTS position. The green band indicates the operating zone.

2. The charging current is shown on the meter lower scale when the meter selector switch is placed in the AMPS position. The green band shows the operating zone which ranges from 360 to 440 milliamps.

(c) The POWER INPUT J1 connector is used to attach the W1 power cable to the monitoring set for battery charging operation.

(d) The EXTERNAL AC/DC power switch is a three-position switch that enables the battery charger to be used with an AC or DC power source. The third position is the OFF position.

(e) The INTERNAL power switch is a two-position ON/OFF switch which is placed in the ON position when operating with the internal batteries.

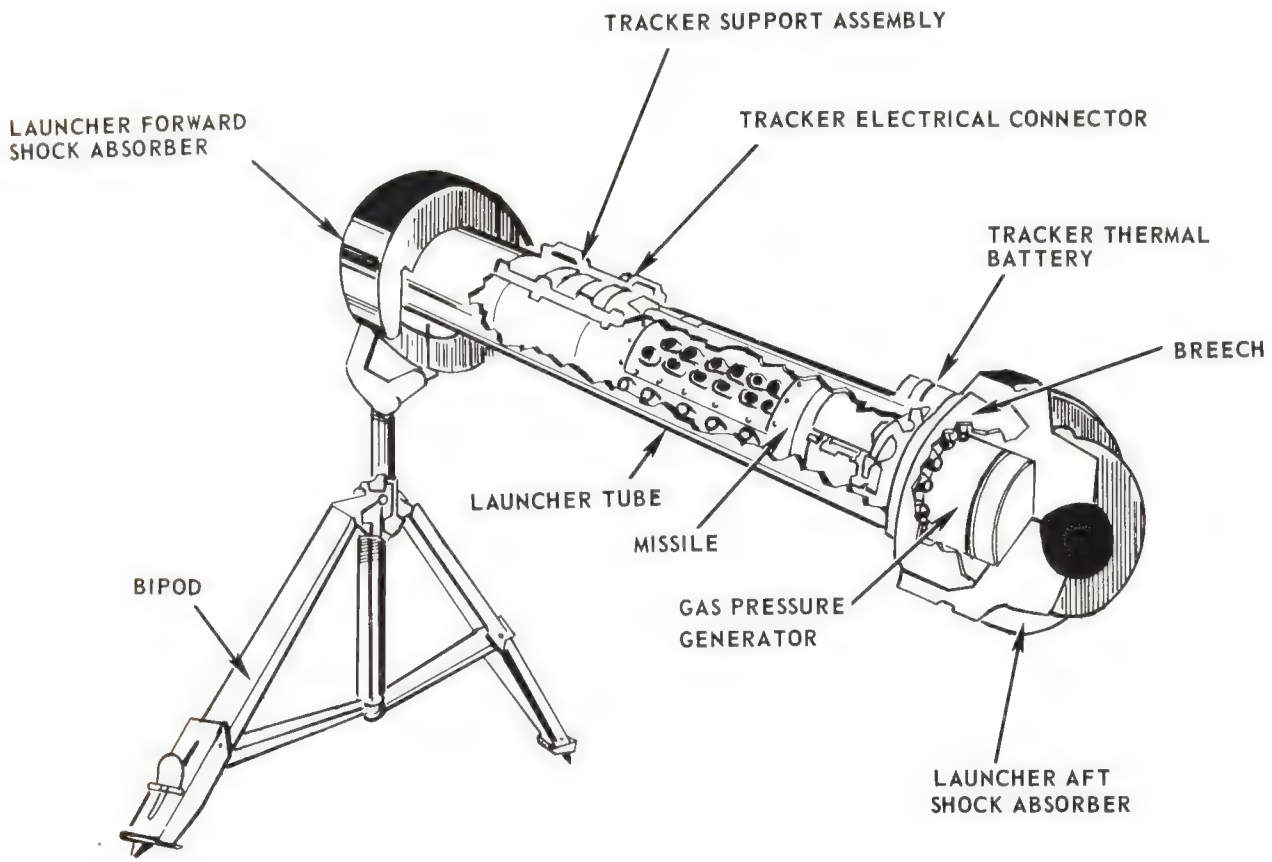


Figure 2-5. Round (cutaway).

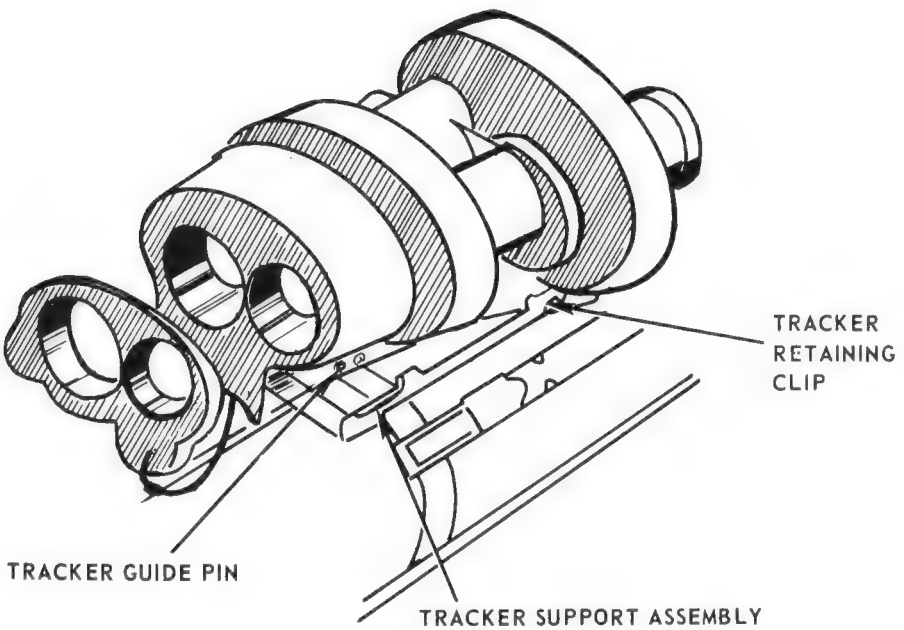


Figure 2-6. Tracker/round mating.

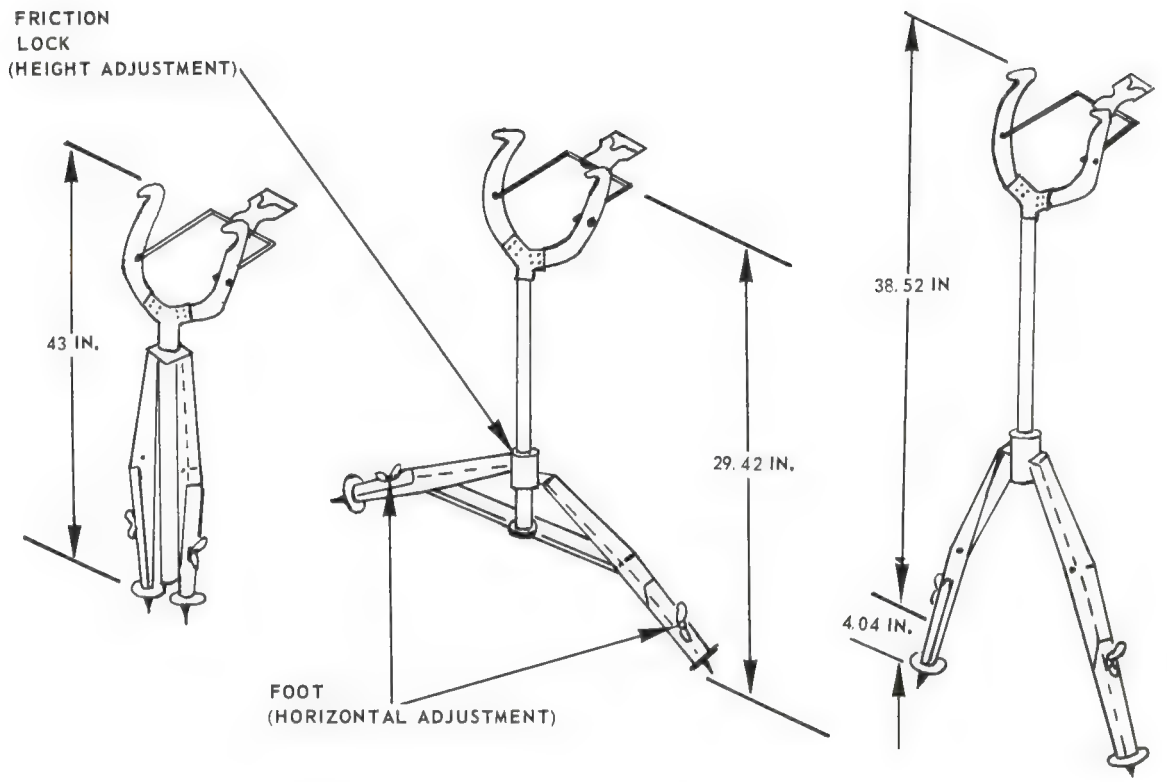


Figure 2-7. Bipod adjustment.

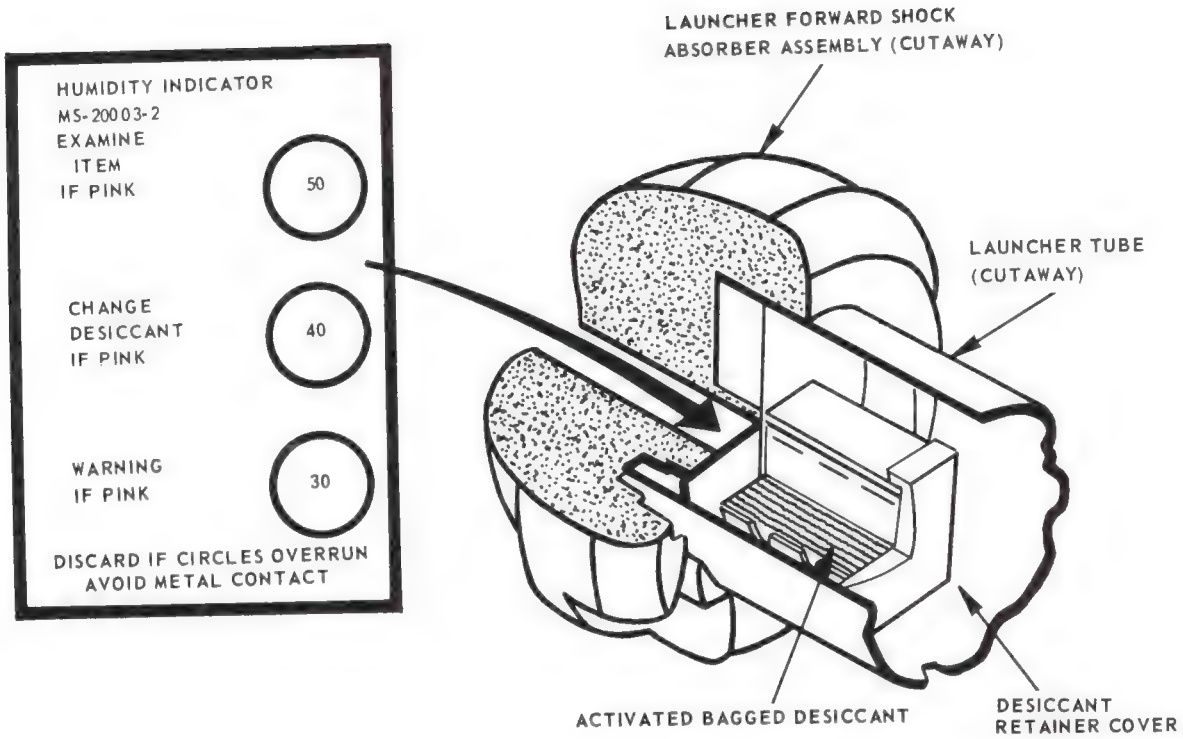


Figure 2-8. Forward shock absorber.

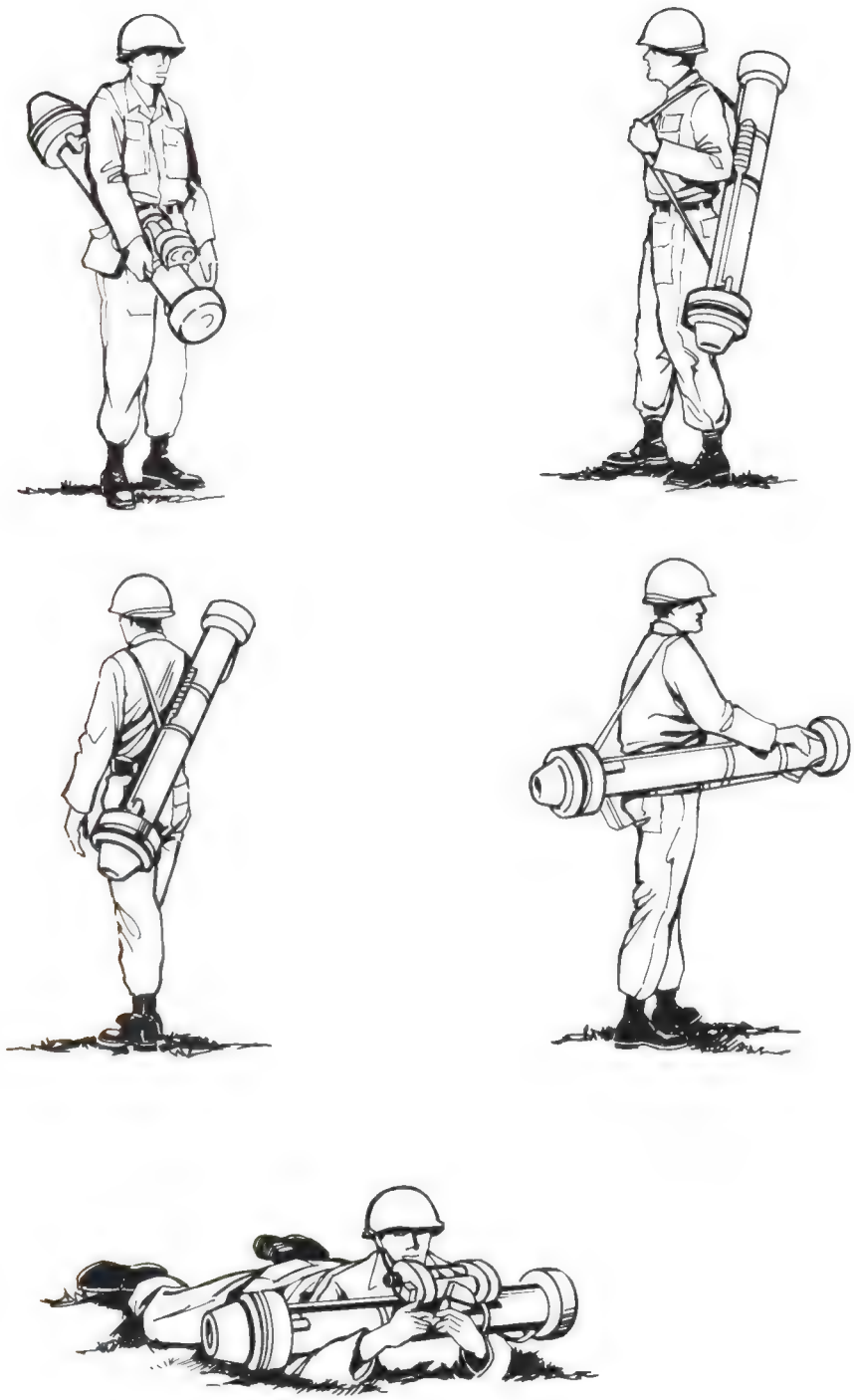


Figure 2-9. Weapon carrying positions.

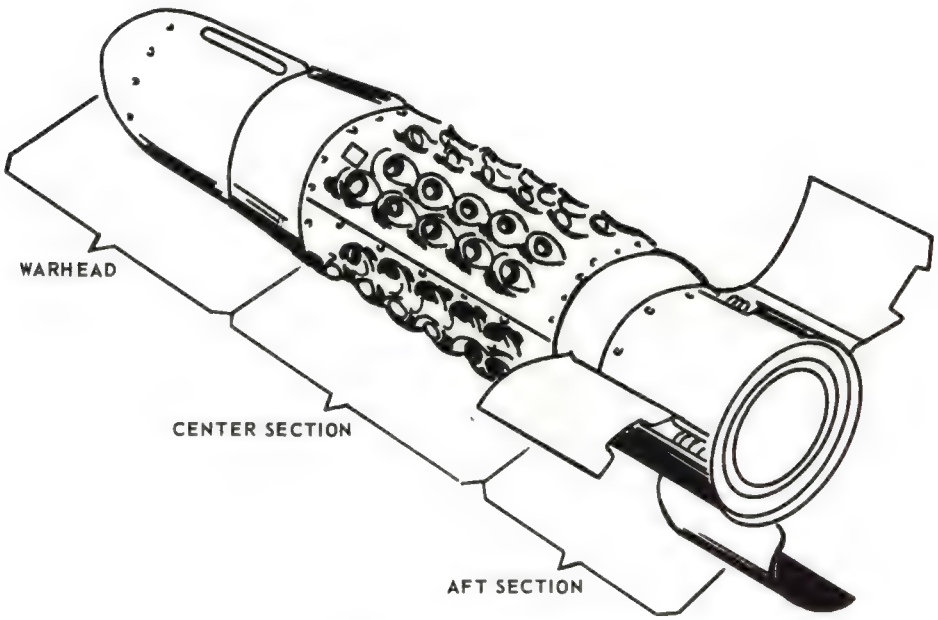


Figure 2-10. Dragon missile.

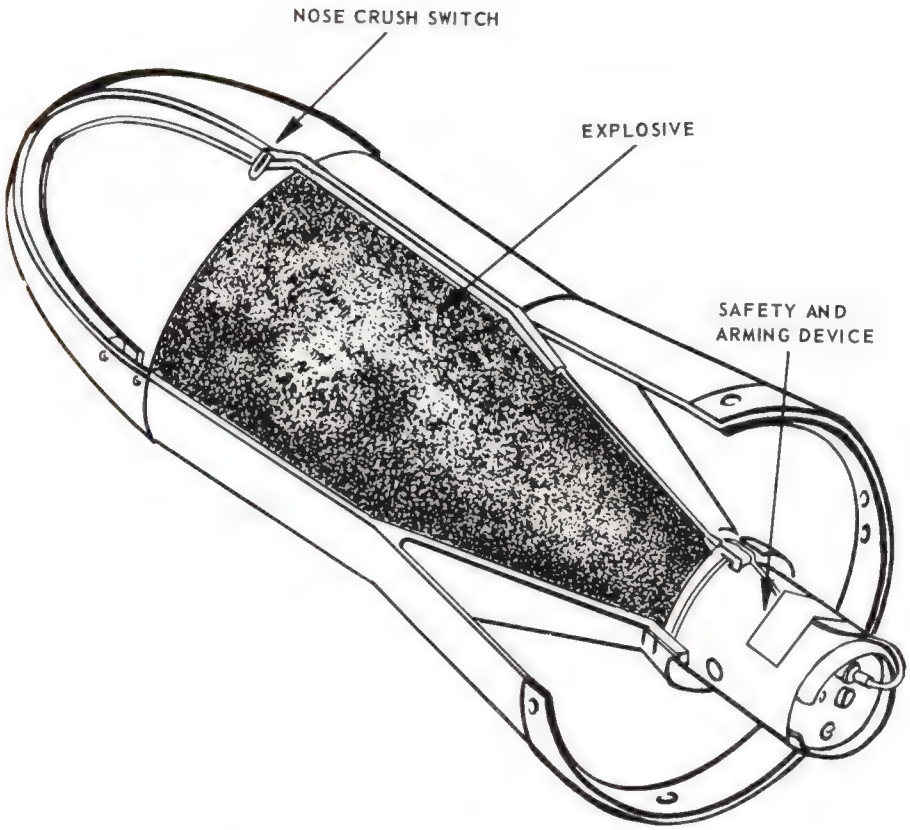


Figure 2-11. Dragon missile warhead section.

(2) *Monitoring set controls and indicators.* (fig 2-17).

(a) The J1 LET connector accepts the trainer/monitoring set interconnect cable from the launch effects trainer.

(b) The J2 recorder connector is used to connect a graphic recorder to the monitoring set to permanently record the gunner's tracking performance. (The recorder is not part of and will not be issued with the training equipment.)

(c) The J3 Monitoring Test Set connector provides test points for use during monitoring set maintenance and calibration.

(d) The TRACKER BIAS switch is a two-position switch (automatic and manual). The MANUAL position is used for known target ranges and enables vertical and horizontal bias adjustment control. The AUTOMATIC position is used for unknown target ranges. In this position, only the vertical bias is automatic.

(e) The TARGET SIZE switch is a two-position switch that is set to MOVING or STATIONARY depending on the type of target being engaged.

(f) The OFF-TARGET indicator shows the direction of error during each range segment of the tracking exercise.

(g) The HIT indicator illuminates at the end of a successful tracking exercise.

(h) The MISS indicator illuminates at the end of an unsuccessful tracking exercise.

(i) The TRACKER POWER switch is a three-

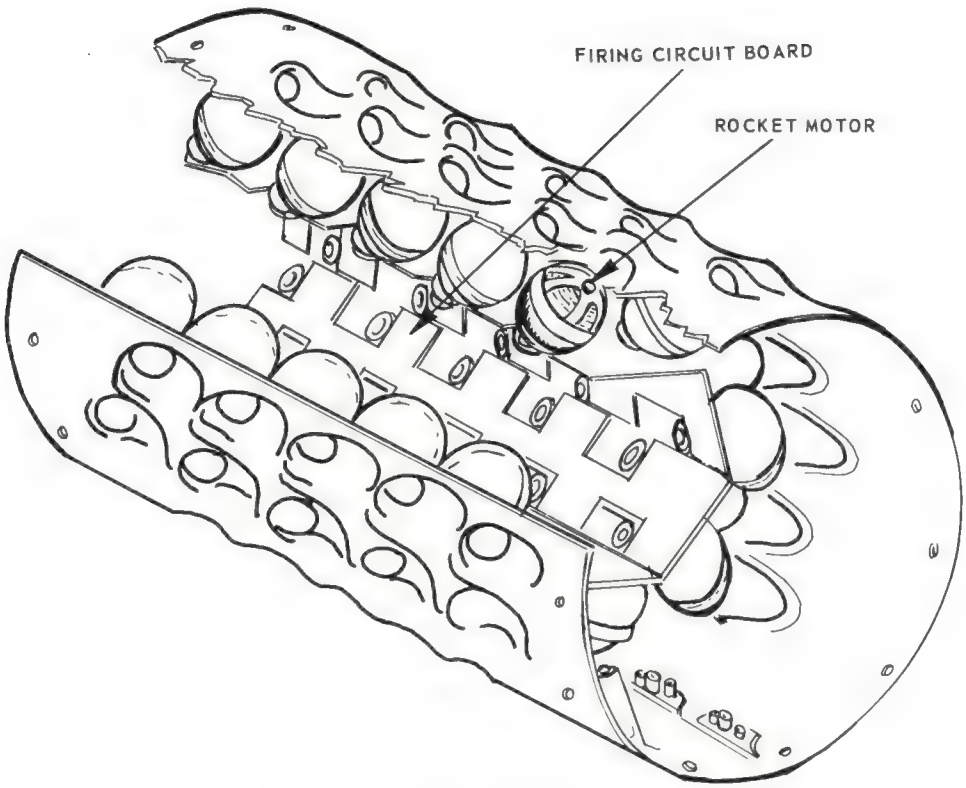


Figure 2-12. Dragon missile center section.

osition switch and is used during monitoring set linement. (R)1-3 position is used for alining the nonitoring set for training from 100 to 300 meters. R)4-10 position is used when alining the monitoring et for training from 400 to 1000 meters. AUTO osition is the normal operating mode after the nonitoring set is alined.

(j) The RECORDER switch is used in conunction with a graphic recorder. The RECORDER witch will be left in the OFF position.

(k) The LIGHTS TEST switch is a twoosition switch that illuminates all indicators on the nonitoring set panel when placed in the ON position. This switch is used to check the operational status of ne panel lights.

(l) The RANGE SEGMENT INDICATORS ctivate consecutively during a particular segment f the tracking exercise.

(m) The ten-position TARGET RANGE switch establishes the length of the tracking exercise by dividing the time required for a tactical missile to fly to its maximum range into ten equal segments. During a tracking exercise, the switch is set to the position corresponding to the simulated range at which the target would be engaged. At the end of the tracking exercise, the switch can be rotated in a counterclockwise direction to provide a review of the gunner's performance by activating the range indicator if a miss is reflected.

(n) The RESET button is a pushbutton switch that resets the electronics and scoring circuits within the monitoring set.

(o) The TRIGGER indicator lamp activates when the trigger lever is squeezed.

(p) The INFRARED XMTR indicator lamp is activated when the target is acquired. Intermittent activation may indicate the target vehicle is beyond the range of the tracker.

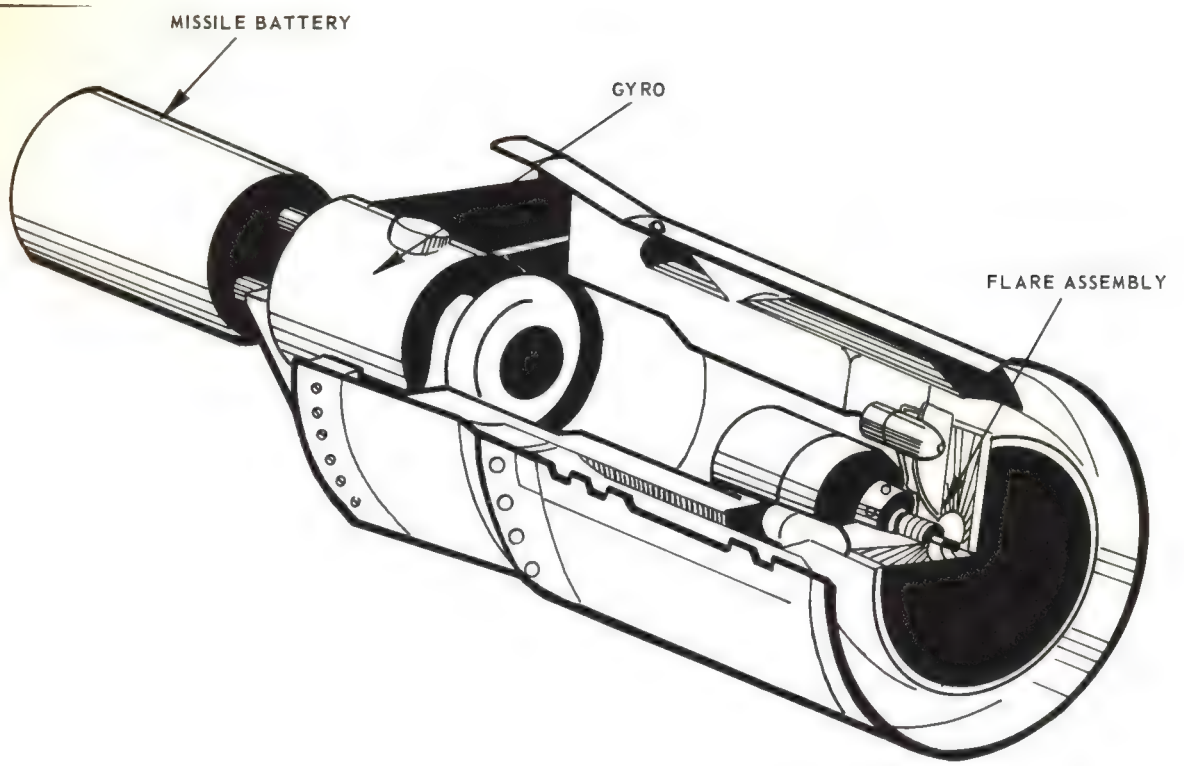


Figure 2-13. Dragon missile aft section.

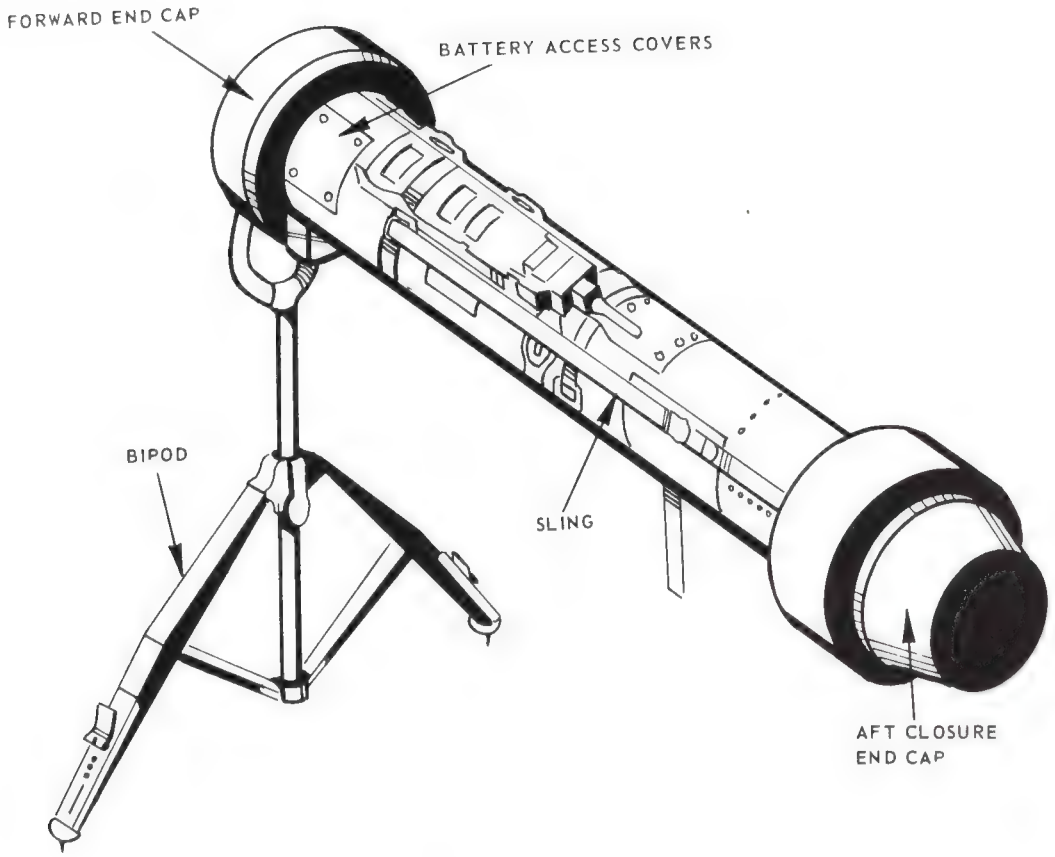


Figure 2-14. Launch effects trainer.

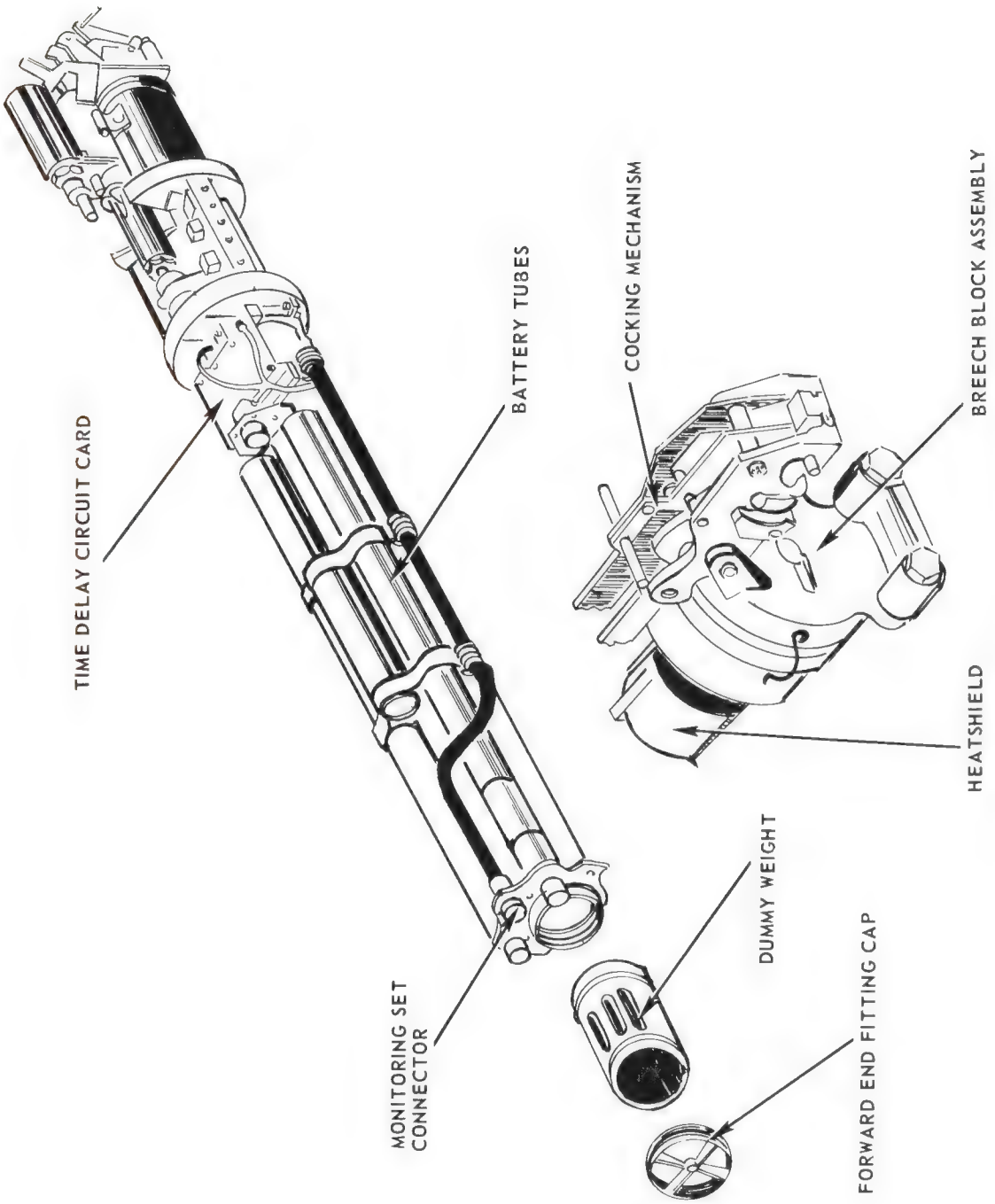


Figure 2-15. Launch effects trainer subassembly.

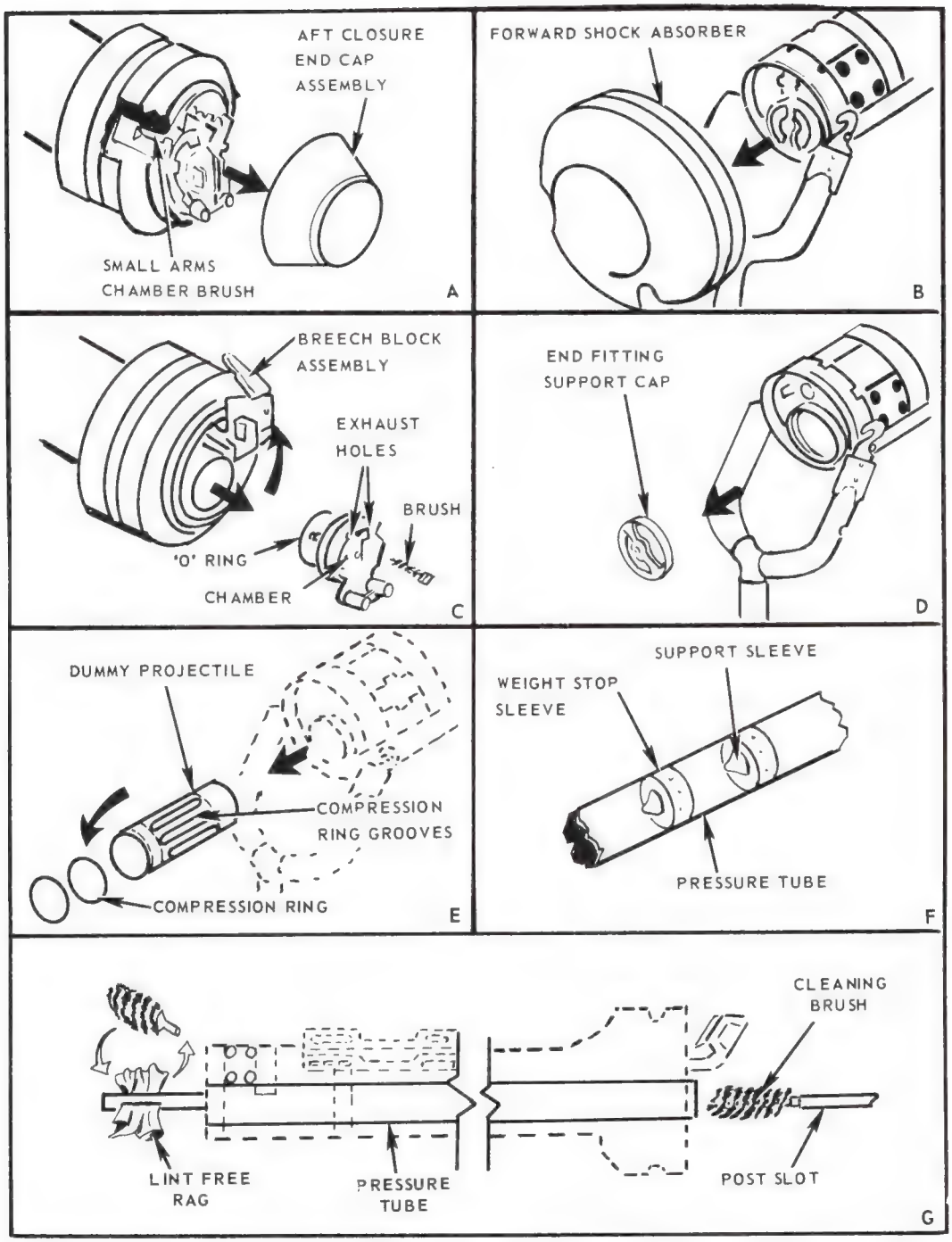


Figure 2-16. Launch effects trainer disassembly.

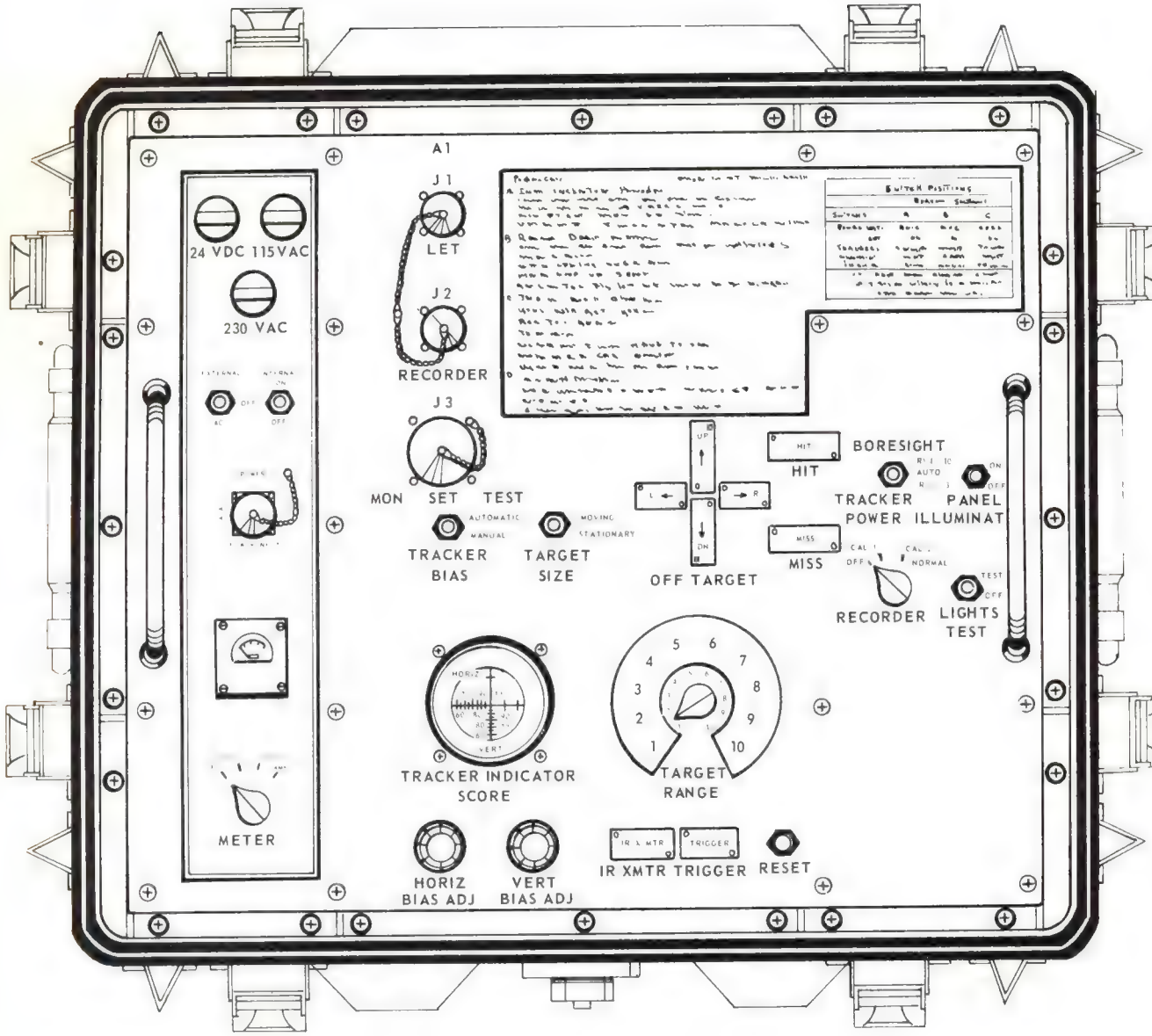


Figure 2-17. Monitoring set.

(q) The TRACKER INDICATOR SCORE meter consists of floating crossbars that show the deviation of the gunner's line of sight from the aiming point on the target vehicle during a tracking exercise. The crossbars lock in a position which shows a summation of the gunner's vertical and horizontal deviations at the completion of a tracking exercise.

c. The infrared transmitter emits an infrared signal which establishes a link between the Dragon tracker and the transmitter during the tracking exercise. It has an effective range of 300 meters. The infrared signal simulates the signal emitted by a tactical missile. The transmitter, with a +24 vo DC power requirement can be mounted on the M15 ¼-ton truck, M60A1 tank, the M113 armore personnel carrier, and the M561 gamma goat (fig 2 19). The major components of the transmitter are target source, a power supply/modulator, a targe board, and a target mouting kit. The infrare transmitter receives all necessary power from th target vehicle's 24-volt DC battery. The targe source generates an infrared light source whic simulates an in-flight missile. As the center of th target board is tracked by the Dragon gunner, th infrared receiver in the tracker detects and tracks th

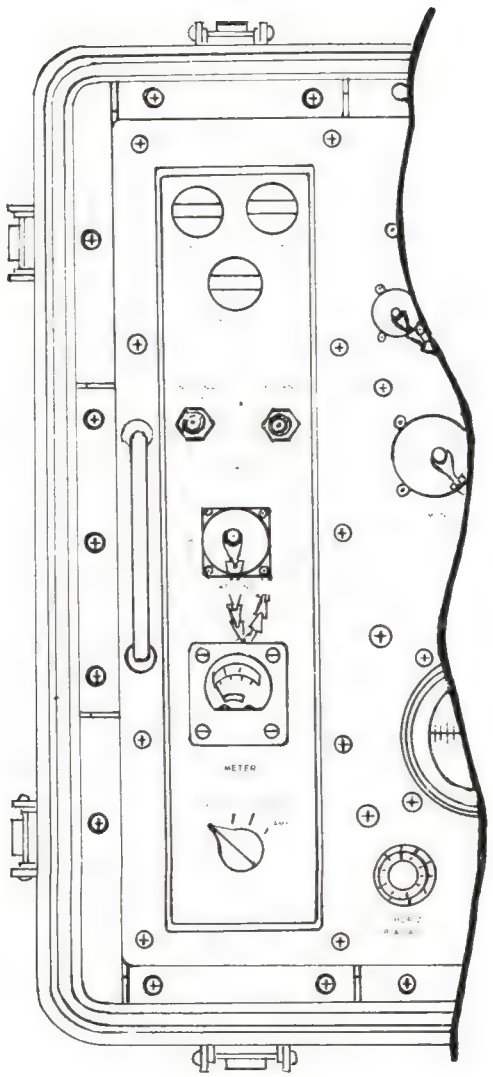


Figure 2-18. Battery charging control panel.

nfrared light source. This information is then used y the monitoring set to score the gunner.

(1) *Target source.* The target source consists nainly of an infrared lamp, three reflectors, a quartz vindow, an infrared filter, a blower assembly, a high oltage power supply, and a protective cover. The amp provides the infrared energy which is formed nto a beam by the reflectors. The infrared filter is esigned to limit the target source energy (in the isible spectrum) to a level which does not exceed the nrgy produced by the tactical missile source. The quartz window covers the lamp and protects the nfrared filter. The blower assembly helps cool the lamp. The high voltage power supply provides power to start the lamp. A 15,000-volt starting surge is provided to the starter electrode of the lamp. This starting surge ionizes the gas for arc formation. Once the gas is ionized by the high voltage power supply, the lamp begins operation. A protective cover prevents damage to the quartz window when the target source is not being used.

(2) *Power supply/modulator.* The power supply/modulator (fig 2-20) provides the power to, and controls the operation of, the target source. Table 2-1 lists the controls on the power supply/modulator and their functions. When the target

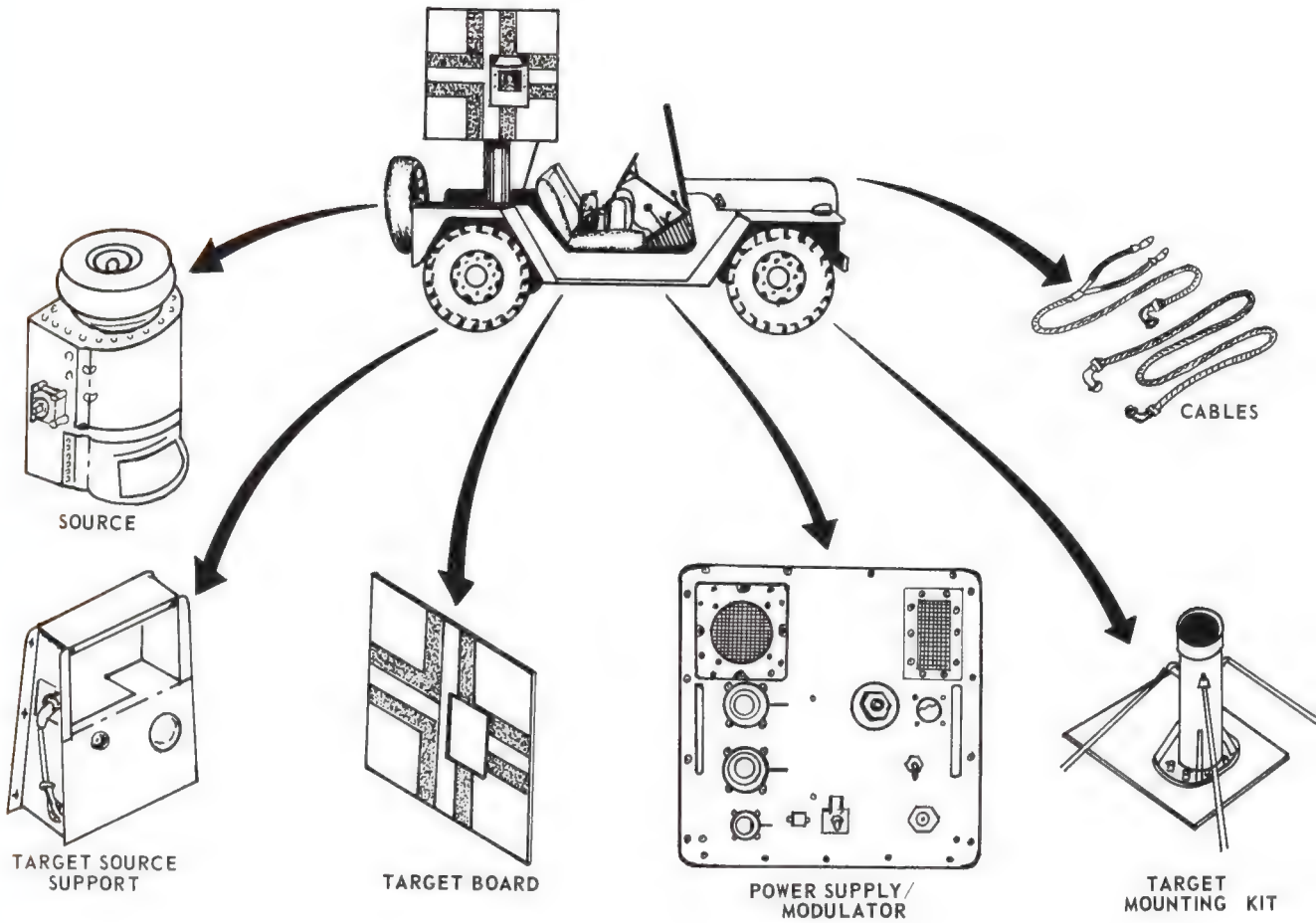


Figure 2-19. Infrared transmitter.

source lamp begins operating, a voltage sensing circuit disables the lamp starting circuits. A constant-current source in the power supply/modulator provides a bias current of 2 amps DC to the lamp as a keep-alive current. A power control circuit in the power supply/modulator monitors the lamp power and maintains the power at a constant 300 watts. The power supply/modulator is installed in the brackets provided for that purpose on the target vehicle.

(3) *Target board assembly.* The aluminum allo target board is a one-meter-square target used wit adapters for mounting on the target vehicle. Th target is a red cross painted on a white backgroun and is used as the aiming point for the Drago gunner. The target source is off-center from th target cross pattern. This allows for the offse between the objective lens system and the infrare receiver in the tracker.

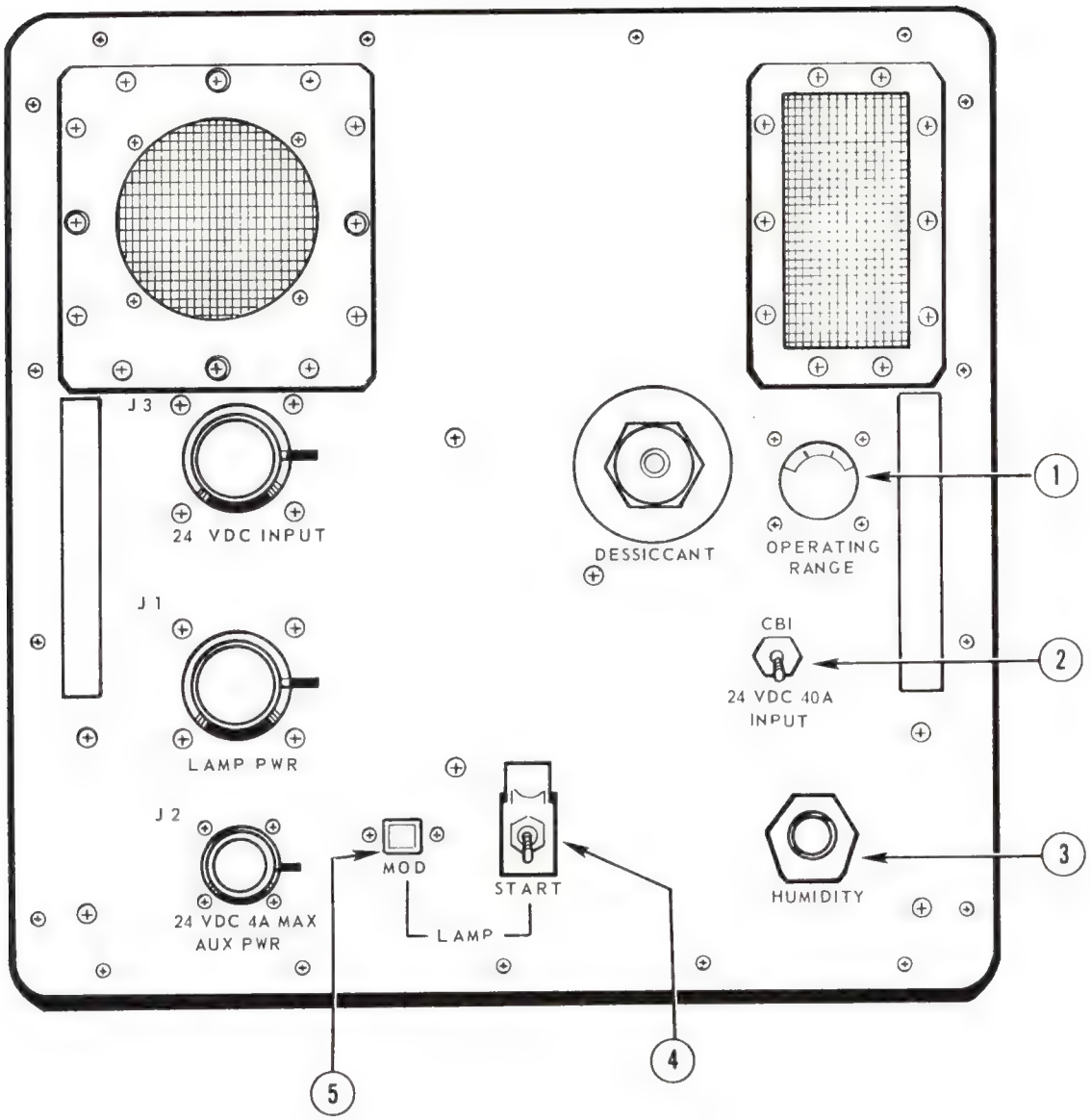


Figure 2-20. Power supply/modulator control panel.

(4) *Target mounting kit.* The target mounting it for mounting the infrared transmitter on a vehicle onsists of the following:

(a) The universal adapter plate with ssociated hardware, which serves as the base of the ransmitter and attaches to the M60A1 tank.

(b) The pedestal, which is attached to the ppropriate holes in the universal adapter place. The arget support is attached to the pedestal with a oupling clamp.

(c) The cargo slings, which are attached to the pedestal to secure the transmitter to the M151 ¼-ton truck, M113 Armored Personnel Carrier and the M561 Gamma Goat.

(5) *Connecting cables.* There are two connecting cables for the infrared transmitter. Each cable is packaged in a container shich is stored in the cable set shipping case. These two cables are:

(a) Target source cable.

(b) Power supply/modulator battery cable.

(6) *Cable set case.* The cable set case is reusable and is used for cable storage.

2-3. Target Set Data. Table 1-1 contains information concerning the physical dimensions and weights of the various infrared transmitter components.

Table 2-1. Power Supply/Modulator Controls and Indicators

Key	Control or Indicator	Function
1	OPERATING RANGE meter	Indicates lamp duty cycle circuitry in power supply/modulator for lamp start.
2	24 VOLT DC 40 AMP INPUT circuit breaker CB1.	Applies vehicle battery power to power supply/modulator; protects against overloads.
3	HUMIDITY indicator	Color indicates humidity.
4	LAMP START switch	Applies power to high voltage starting circuit and connects low voltage starting circuit to lamp for initial firing.
5	LAMP MOD indicator	Shows that lamp is on by the appearance of the word ON or shows that lamp is not operating by appearance of the word OFF.

CHAPTER 3

SAFETY

Section I. DRAGON SAFETY PRECAUTIONS

3-1. **General.** *a.* Refer to TM 9-1300-206 for detailed ammunition handling and storage safety precautions. Local directives and Standing Operating Procedures (SOP) are required to supplement safety precautions. SOP's should include individual responsibilities, safety requirements, proximity limits for troops and explosives, location and sequence of operations, equipment required for handling munitions, and protection of troops.

b. Responsibilities for operations involving explosives must be clearly designated. Rigid observance of safety precautions prohibiting personnel from tampering with the encased missile, other than removing the front shock absorber, must be enforced.

3-2. **Safety Precautions.** *a.* Because of the danger to troops from the backblast of the Dragon, exercise extreme care in all phases of instruction. Conduct team drills, position exercises, and tracking exercises with the launch effects trainer as though a tactical missile were being fired.

b. The Dragon missile backblast area extends 50 meters to the rear of the launcher and forms a 90° danger area (fig 3-1). It is divided into two zones: a danger zone and a caution zone. In the danger zone, which extends 30 meters to the rear of the launcher, serious casualties or fatalities could occur, due to the blast and flying debris. In the caution zone, a man is relatively safe, provided he is not facing the weapon. The area extends an additional 20 meters to the rear of the danger zone, and is kept clear during training.

c. Do not fire the Dragon from confined spaces such as bunkers or rooms. Structural damage to the enclosure may occur and occupants may be injured due to falling debris. Severe concussion and concentration of toxic gases may result, or a fire may be started.

d. Most conventional type weapon emplacements are unsuitable for the Dragon. Any emplacement where there is an obstruction near the breech is unsuitable since the obstruction may deflect the backblast toward the team. The most suitable emplacements are those which leave the rear of the launcher exposed or semi-exposed, with no obstruction behind it, and provide cover for the team on either side of the launcher.

e. Do not fire the missile over live power lines, through brush or brush fires, limbs, or other obstructions that might interfere with missile guidance by damaging the command link wire.

f. Do not allow men or equipment forward of the weapon.

3-3. **Round Handling.** Improper or careless handling of the Dragon round may damage the components and cause the missile to malfunction when it is launched. If the round is dropped, damage could result. If there is any reason to believe the missile has been damaged or there is evidence of launcher deformation or fracture, the round should be returned to the responsible ammunition personnel for inspection.

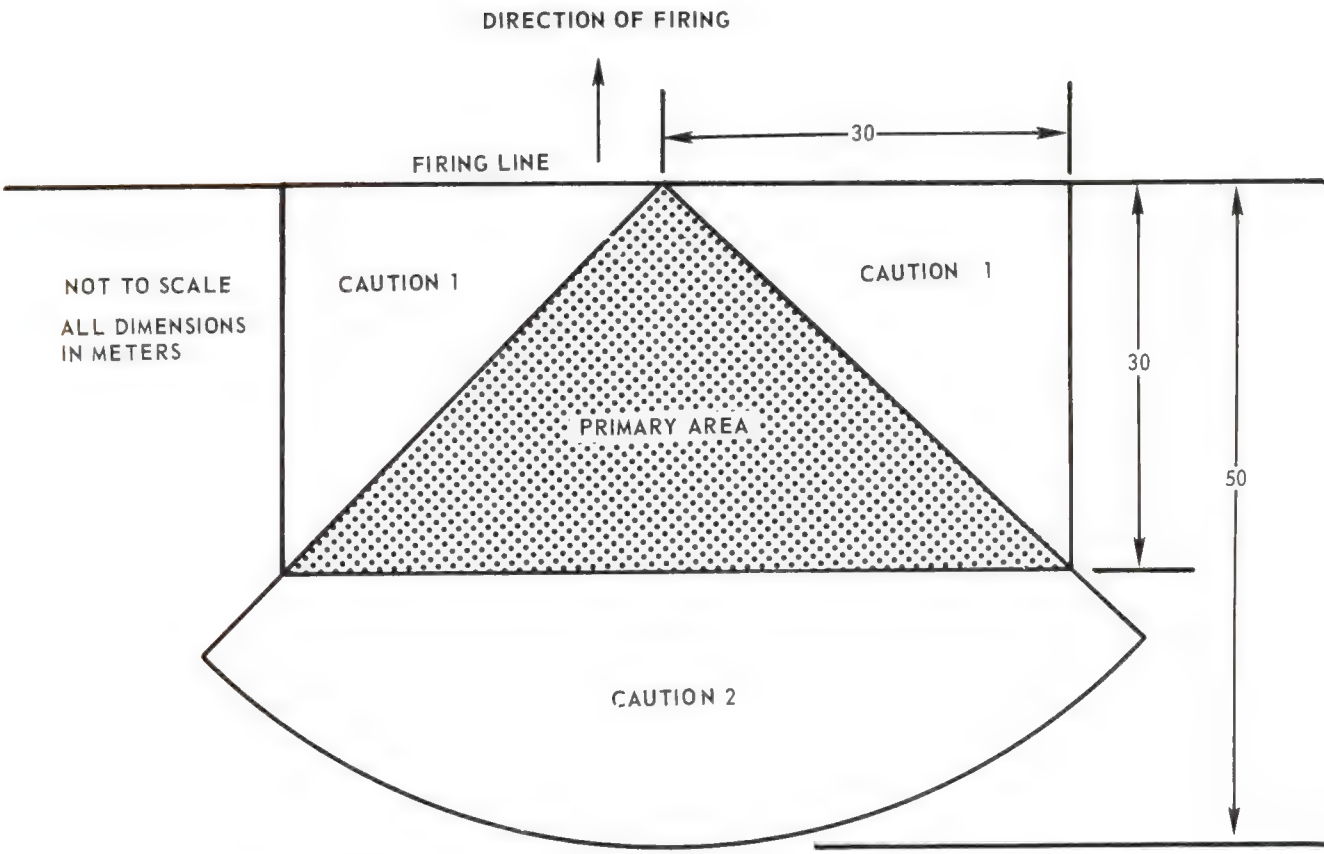
3-4. **Earplugs.** Failure to use proper earplugs during the missile firing could cause serious ear damage. All crew members will wear V-51R (or equivalent) earplugs which have been properly fitted by qualified medical personnel. Figure 3-1 depicts sound level danger areas.

3-5. **Sighting and Aiming Precautions.**

Warning: **Serious eye damage could result from looking at the sun, illumination flares, or searchlights through the tracker optical sight.**

3-6. **Firing Angle Limitations.** During site selection, insure that the aft end of the weapon is not depressed so as to deflect the backblast toward the team. Pressure waves and secondary debris may cause serious injury if the angle of the front of the launcher relative to the ground is greater than 20°. Special care must be taken when firing from a downhill slope or when firing on targets on an uphill slope to insure that the angle of the launcher relative to the ground is not greater than 20°.

3-7. **Malfunction.** *a. Indications of Malfunctions.* A malfunction is a failure of ammunition to function properly when fired. During operation of the Dragon, a malfunction occurs if the missile fails to leave the launcher after the normal .6 second delay after the trigger is depressed, or if the missile fails to function properly in flight. Two major types of malfunctions are misfire and hangfire. In-flight malfunctions are duds and erratic flight. Defective missiles (either fired or encased) must be disposed of by an explosive ordnance disposal team (EOD) only.



CAUTION 1 – EAR DAMAGE COULD OCCUR IF PROPER EAR PROTECTION IS NOT WORN.

CAUTION 2 – NOISE LEVELS AND FLYING DEBRIS COULD CAUSE SERIOUS EAR OR EYE DAMAGE. KEEP PERSONNEL CLEAR DURING TRAINING EXERCISES AND NON-TACTICAL FIRINGS.

Figure 3-1. Dragon backblast area.

b. Misfire Procedures.

(1) A misfire (complete failure to fire) occurs if the gas pressure generator fails to ignite after the trigger has been depressed. A misfire in itself is not dangerous; however, it cannot readily be distinguished from a hangfire (*c* below). Any failure to fire should be considered a hangfire until such possibility is eliminated.

(2) The following immediate action/misfire procedures must be followed in the event of a failure of the missile to fire.

(a) IF THE TRIGGER IS DEPRESSED TO FIRE THE MISSILE AND NOTHING HAP PENS, RESQUEEZE THE TRIGGER, CON TINUE TRACKING THE TARGET, ANI NOTIFY THE WEAPON TEAM THAT A MISFIRE/HANGFIRE HAS OCCURRED. KEE THE WEAPON ON THE SHOULDER ANI TRAINED ON THE TARGET DOWN RANGE

(b) IF THE MISSILE DOES NOT FIR AFTER THE SECOND TRIGGER SQUEEZE WAIT 5 MINUTES, AND INSURE THA

'ERSONNEL REMAIN CLEAR OF THE 'IRING DANGER AREAS.

(c) AT THE END OF 5 MINUTES, A IEMBER OF THE TEAM SHOULD ASSIST 'HE GUNNER IN LOWERING THE ROUND, VITH TRACKER ATTACHED, TO THE GROUND SO THAT THE GUNNER WILL NOT E EXPOSED TO THE FRONT OR REAR OF HE LAUNCHER TUBE. THE TEAM MEMBER HOULD APPROACH FROM THE SIDE VITHOUT EXPOSING HIMSELF TO THE RONT OR REAR OF THE LAUNCHER TUBE. HE ROUND, WITH TRACKER ATTACHED, HOULD BE PLACED FLAT ON THE GROUND O MINIMIZE POSSIBLE REFLECTED BLAST ROM THE GROUND. THE WEAPON TEAM VILL THEN EVACUATE THE WEAPON SITE ND NOTIFY EOD PERSONNEL THAT A IISFIRE/HANGFIRE HAS OCCURRED AND HE LOCATION OF THE WEAPON.

(d) AFTER WAITING AN ADDITIONAL) MINUTES, THE TRACKER MAY BE EMOVED FROM THE ROUND.

c. Hangfire. A hangfire is an unexpected delay in ie functioning of a series of ammunition com- onents. It may occur anywhere in a series of events' om pressing the firing trigger to gas pressure generator ignition. The amount of delay of a hangfire is unpredictable and may vary from a fraction of a second to several minutes. The principal danger of a hangfire is that it may be mistaken for a misfire. If such a delay occurs, continue tracking the target and follow the procedures described for misfire in *b* above.

d. Dud. A dud is any missile warhead which fails to detonate upon target impact. The warhead of all duds must be considered to be armed; therefore, they are extremely dangerous. Note the location of all duds and report them to EOD personnel for disposal.

e. Erratic Flight. Erratic flight is uncontrolled missile flight. It may be a result of one of the following:

(1) Shorted or broken wire.
(2) Excess gunner tracking errors.
(3) Defective fin assembly.
(4) Defective rocket motors.
(5) Defective tracker.

Note: Report all missile malfunctions in accordance with AR 75-1.

f. After Firing. After a Dragon missile is fired all rocket motors may not be expended. All intact rocket motors should be considered LIVE and DANGEROUS. The location should be noted and reported to EOD personnel for disposal.

Section II. DRAGON TRAINING EQUIPMENT SAFETY PRECAUTIONS

-8. Safety Precautions. The M64 grenade launching artridge has a backblast area which extends 3 ieters to the rear of the launch effects trainer (LET) nd forms a 90° danger zone (fig 3-2). For training urposes, troops should observe the backblast area f a tactical missile (50 meters).

-9. Hangfire or Misfire. *a.* In the event of a angfire, notify the monitoring set operator that a angfire is in progress and continue to track the irget for 60 seconds. Then proceed with misfire rocedures described in *b* below.

b. In case of a misfire, the gunner should maintain the LET in the firing position until the assistant gunner unloads the M64 grenade launching cartridge.

Warning: **If a misfire occurs in which the primer explodes but fails to ignite the powder charge, the pressure chambers must be cleaned before the LET is used.**

c. When misfires (in excess of 5 percent) occur that are not attributed to a malfunctioning firing mechanism, notify the ammunition supply point as soon as possible.

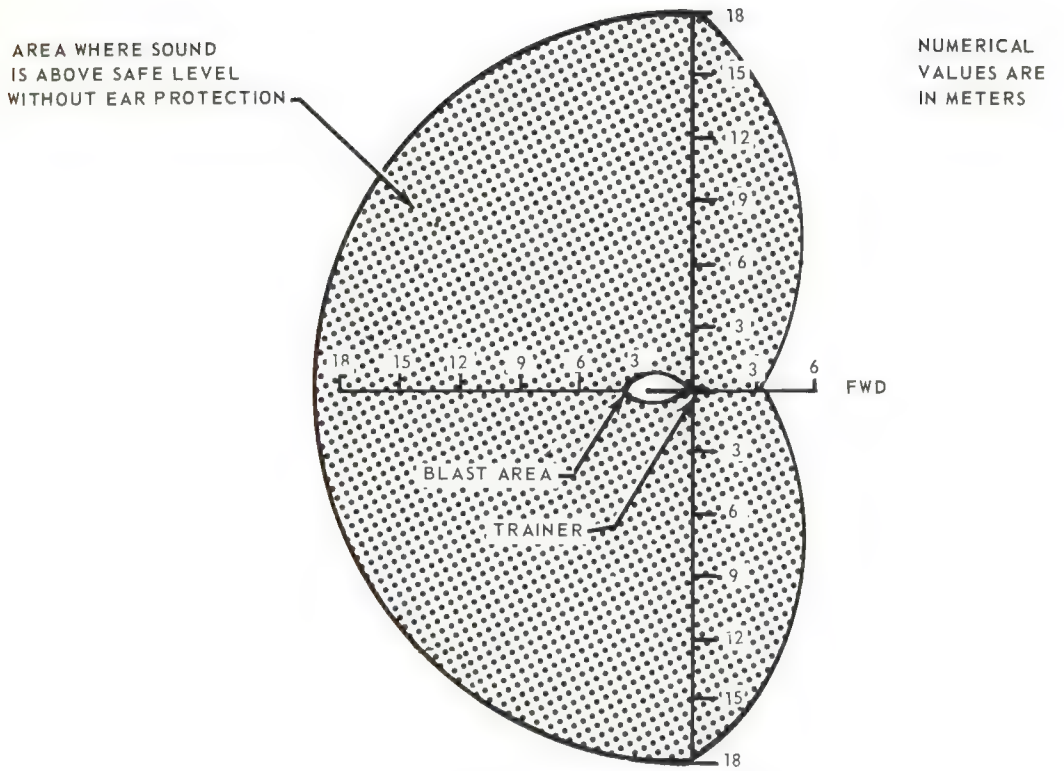


Figure 3-2. Launch effects trainer backblast area.

CHAPTER 4

OPERATING PROCEDURES AND FUNCTIONING

4-1. System Inspection. The Dragon Weapon System inspection is limited to a visual inspection and check for physical damage by the gunner. The inspections and checks in table 4-1 should be made.

4-2. Operating Procedures and Functioning. The system operating procedures and functioning are described in sequence in the following 12 steps:

a. Step 1—Round Inspection. Visually inspect the physical condition of the round as stated in table 4-1.

b. Step 2—Deployment of the Weapon. Extend the bipod by unsnapping the bipod retainer strap. Grasp the bipod and push it to the vertical lock position. Deploy the bipod by depressing the friction lock and extend it to the operator's desired height.

c. Step 3—Tracker Inspection. Remove the tracker from the carrying bag and inspect the physical condition of the tracker as stated in table 4-1 and remove the tracker and round electrical connector covers.

d. Step 4—Round and Tracker Mating. Position the forward and rear tracker guide pins in the tracker support guide rails, and slide the tracker to the rear until it locks into place. Remove the tracker lens cap (fig 2-2).

e. Step 5—Firing Positions.

Table 4-1. System Inspection

Item	Inspection check
Warning: **Before checking trigger operation, insure that the tracker is not mated with the round.**	
Trigger, safety	Depress safety and squeeze the trigger. Check the mechanical operation of the safety and trigger, insuring they spring back properly after they are released.
Infrared receiver	Insure the infrared receiver lens is intact and undamaged.
Electrical connector	Insure the electrical connector (where the tracker mates with the round) is undamaged.
Launcher	Insure the launcher is free from deformation that may interfere with missile launch, i.e., cracks, dents, or bulges.

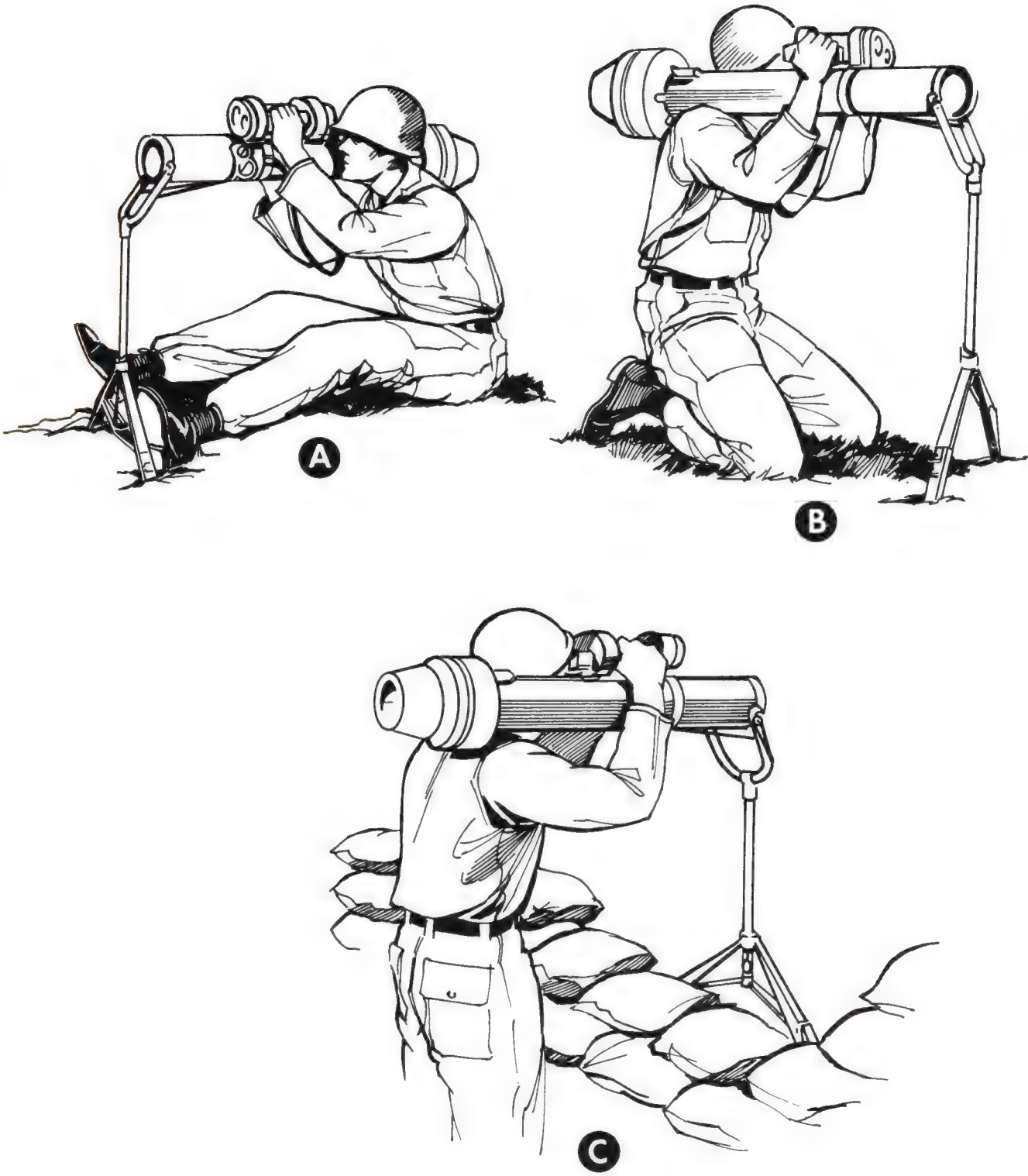
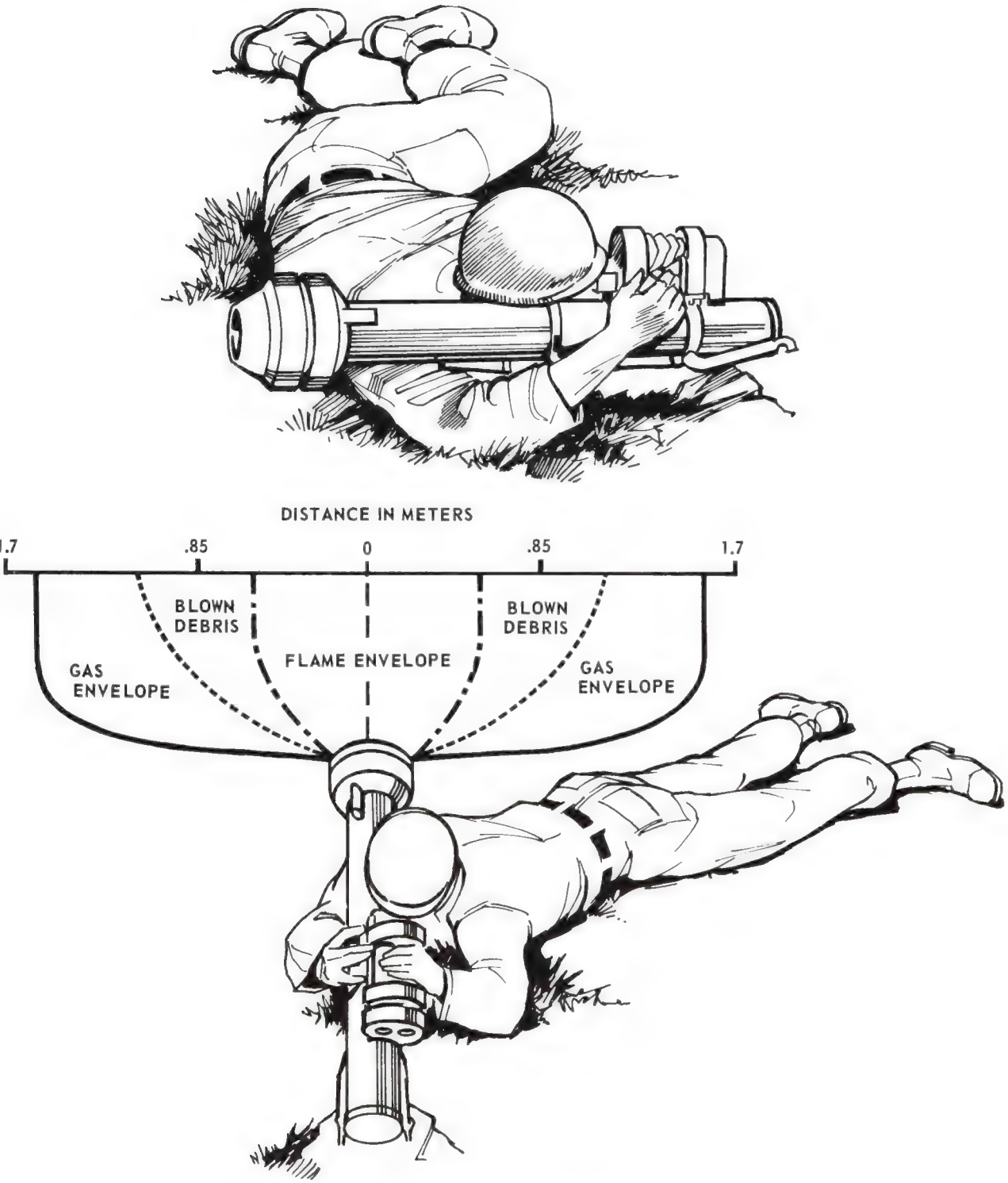


Figure 4-1. Firing positions.



D. Prone position.

Figure 4-1—Continued.

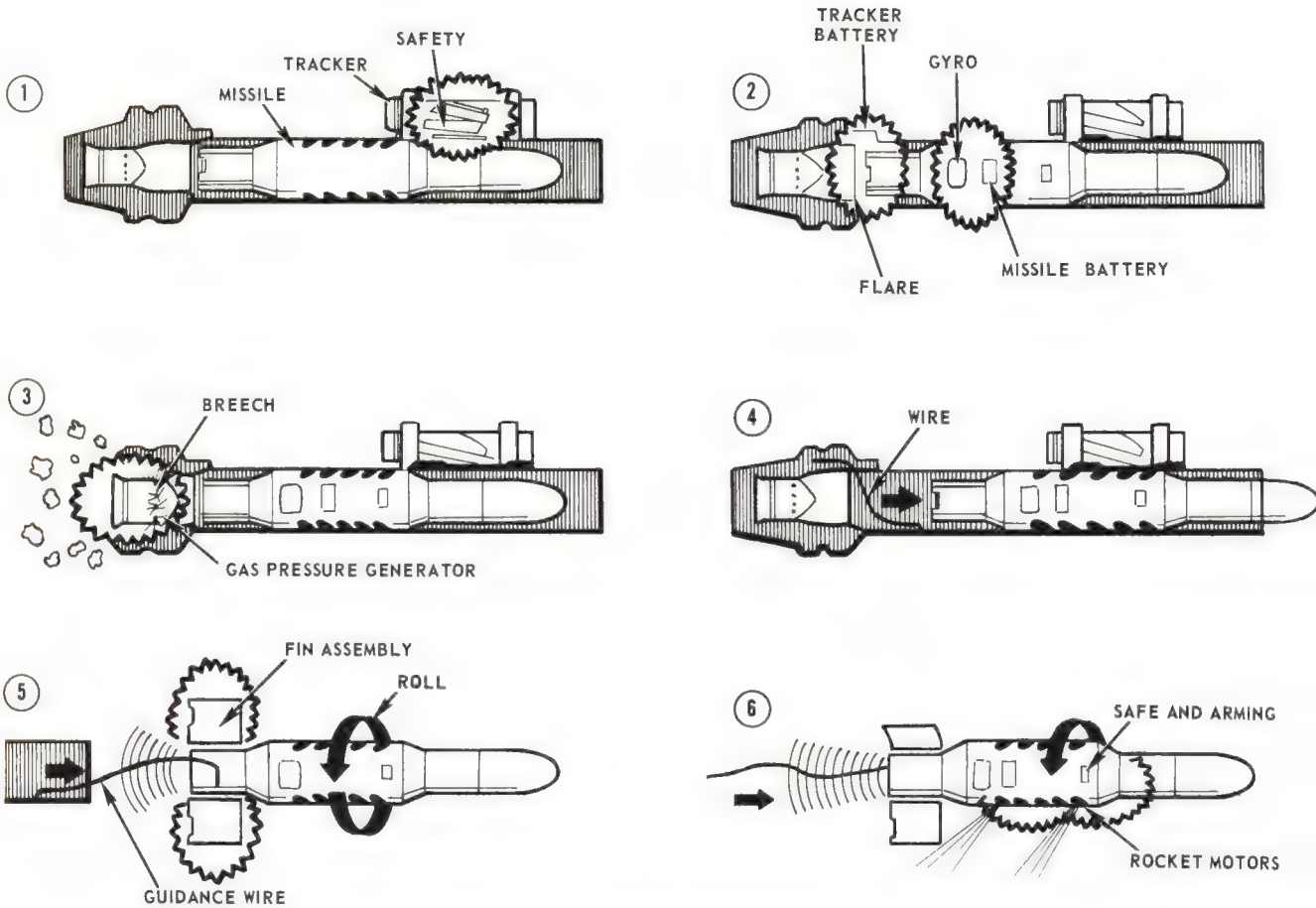


Figure 4-3. Dragon functioning sequence.

warhead is crushed upon impact and initiates the fuse function which in turn detonates the shaped charge warhead.

l. Step 12—Termination of Missile Flight. The tracker must be removed from the launcher when missile flight is terminated. Release the retaining clip at the rear left side of the tracker support assembly, slide the tracker forward and lift it clear of the support. The expended round may now be destroyed and discarded.

4-3. Adverse Weather Conditions. The Dragon is capable of operating in all weather conditions, providing the gunner can see the target.

a. Cold Weather. Check the optical surfaces and all mechanical devices for proper operation prior to weapon deployment. Insure no ice or snow has formed on the tracker components. The Dragon should never be operated in temperatures lower than −25° F.

b. Hot Weather. Provide as much shade or cover as possible to avoid subjecting the round and tracker to prolonged direct sunlight in hot weather. The Dragon should never be operated in temperatures above +145° F.

4-4. Carrying the Dragon. The Dragon can be man-carried in either of two conditions; round and tracker mated, or round and tracker separated.

a. Round and Tracker Mated. Keep the protective covers in place until weapon use is anticipated. The protective covers will prevent possible damage to the tracker lens and keep foreign objects out of the launcher. The carrying options, illustrated in figure 2-9, can be used with the round and tracker mated. However, this carrying option should be used only when firing is imminent, because the weapon system is in a ready to fire configuration.

b. Round and Tracker Separated. The tracker carrying bag provides better protection for transporting the tracker when targets are not anticipated than that described in paragraph *a* above. The weapon is normally carried with the round and tracker separated. Refer to figure 2-9 for carrying positions.

CHAPTER 5

DRAGON TRAINING EQUIPMENT OPERATION

Section I. OPERATING INSTRUCTIONS

. **Emplacement Monitoring Set.** The monitoring should be located to the left of the LET, outside the immediate firing area (fig. 5-1).

. **Monitoring Set Preparation.** Insure that the TERNAL and EXTERNAL power switches and CORDER switch are in the OFF position and at the tracker power switch is in the AUTO sition before making the necessary cable con-ctions (fig 2-17).

a. Place the SELECTOR switch in the + VOLTS sition. METER indicator should be within the een band.

b. Place the SELECTOR switch in the — OLTS position. Meter indicator should be within e green band.

Note. If the meter indicator is not within the green band, the tery will require recharging.

c. Place the SELECTOR switch in the OFF sition.

d. Connect the LET/monitoring set interconnect cable W2P1 to the monitoring set jack LET J1A1, and the W2P2 to the LET electrical connector (fig 5-1).

e. If an external power source is to be used to operate the monitoring set, connect the monitoring set battery charging cable W1P2 to the power input connector. Make one of the following additional cable connections, depending on the type external power source being used (fig 5-2).

(1) For 24/30 volt DC, external power source, connect battery charging cable W3P2 to W1P1; then connect W3P1 to the external power source.

(2) For 105/130 volt AC, 60 cycle external power source, connect battery charging cable W4P2 to W1P1; then connect W4P1 to the external power source.

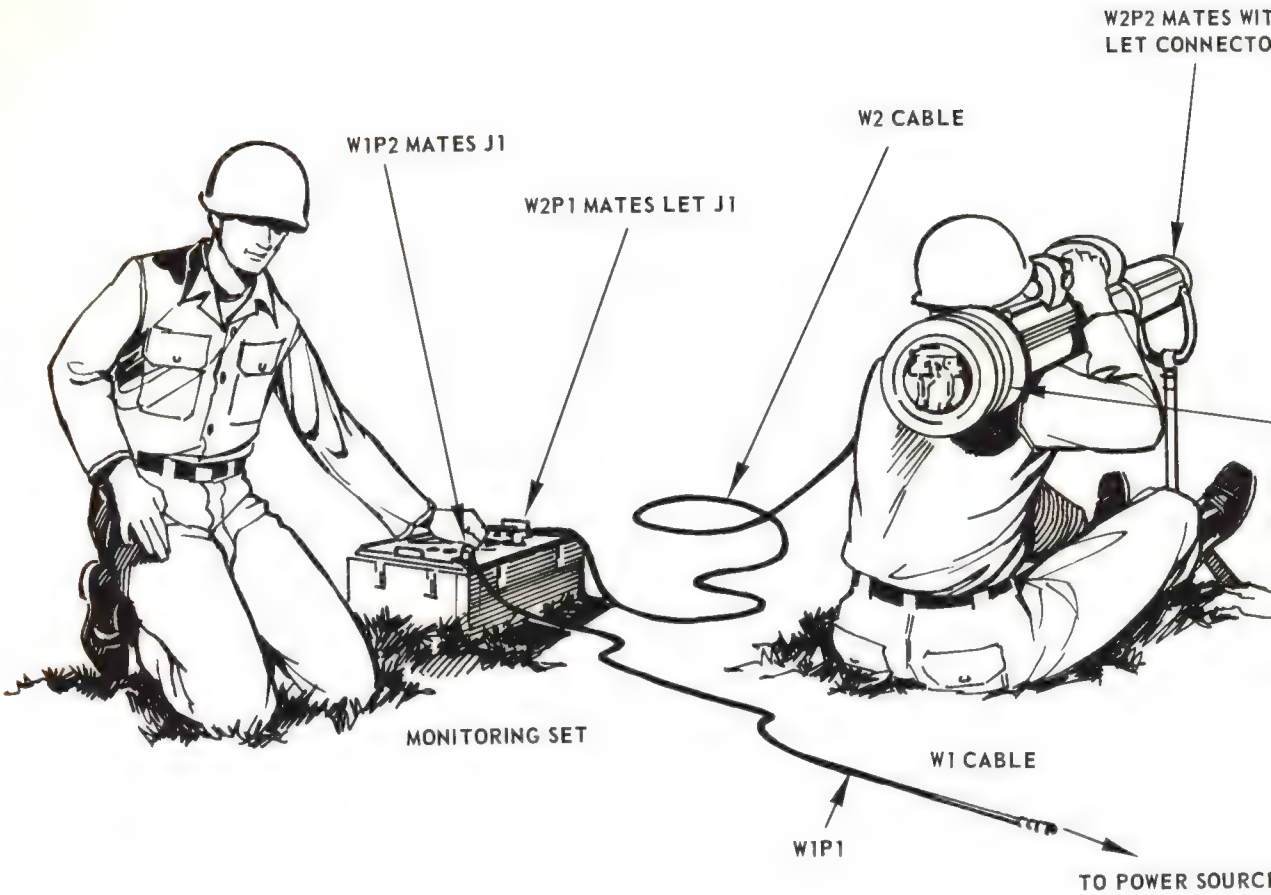


Figure 5-1. Let/monitoring set cable connections.

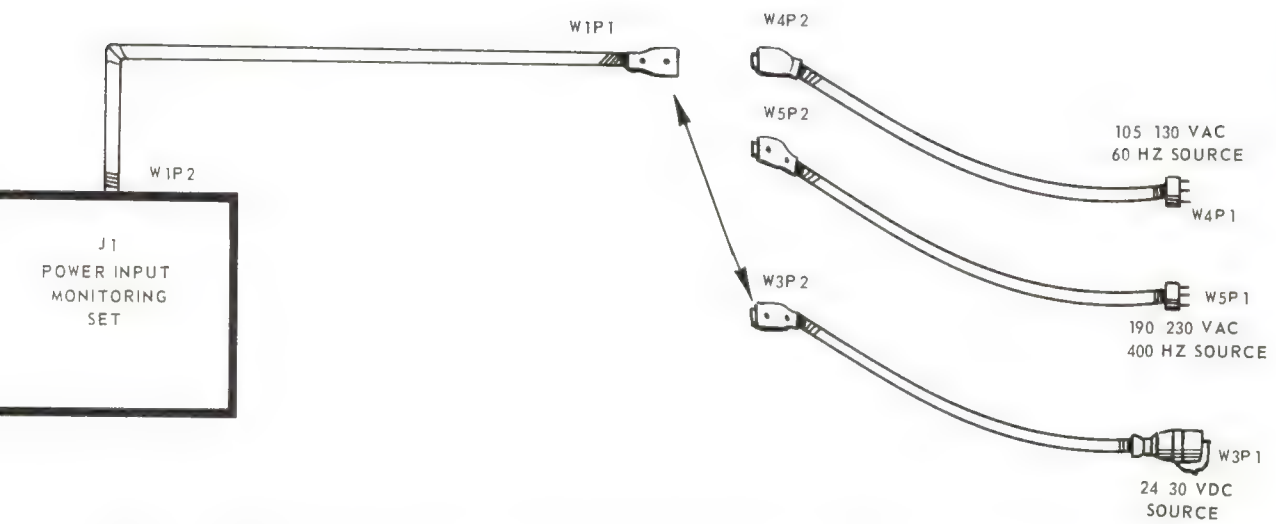


Figure 5-2. Cable connections for battery charging operations, and when operating the monitoring set from an external power source.

Monitoring Set Alinement. During a tracking rcise, the gunner tracks the center of the target rd. In order to aline the monitoring set to the cker it will be necessary to perform the alinement cedure descrebed in table 5-1.

. When operating the monitoring set with the ACKER BIAS switch in AUTOMATIC (setting targets of unknown ranges), refer to table 5-1 to e the horizontal circuits. Alinement of vertical uits is accomplished when the tracker trigger r is depressed.

. When operating the monitoring set with the ACKER BIAS switch in MANUAL, refer to le 5-1 for alinement procedures.

Tracker/ Let Preparation. *a.* Unsnap the LET od (fig 5-4 retaining strap, grasp the bipod, and h it to the extended position. Insure the forward ce locks into position. Depress the bipod brake assembly on the lower bipod tube assembly and extend the bipod legs.

b. The LET forward resilient mount is automatically ejected when the bipod is lowered.

c. The gunner gets into a firing position.

d. Install the tracker (fig 2-6).

(1) Remove the tracker electrical connector protective cover and the electrical protective cover on the LET.

(2) Position the forward and rear tracker guide pins in the tracker support guide rails.

(3) Slide the tracker to the rear until the retainer clip locks in place.

(4) Remove the tracker lens cover by pushing it straight forward.

e. Connect the LET/Monitoring Set interconnect cable connector to the electrical connector on the forward end of the LET.

f. Reset the LET dummy weight with the cleaning rod, by pushing the rod through the hole in the forward end fitting cap.

Table 5-1. Monitoring Set Alinement

M = Monitoring Set.
LET = Launch Effects Trainer.
TRAN = Infrared Transmitter.

STEP No.	UNIT Panel	OPERATION *Normal Indication* Corrective Action if Indication Does not Occur
1	TRAN	Establish communications with the transmitter operator. Move to the range at which the exercise is to be conducted.
		Note: Insure tracker power switch is in AUTO position before applying power to the monitoring set.
2	M	Set INTERNAL POWER switch to ON.
3	M	Set TARGET RANGE switch to the range segment at which the transmitter is deployed.
4	M	Set TARGET SIZE switch to STATIONARY.
5	M	Set TRACKER BIAS switch to MANUAL.
6	TRAN	Notify transmitter operator to turn transmitter ON.
7	LET	Gunner assumes a firing position and alines the tracker optical sight crosshairs on the center of target board and maintains a steady track on the target.
		***Warning:* Do Not *Load* the LET for alinement procedures.**
8	LET	Assistant Gunner cocks the LET.
9	M	Set TRACKER BIAS switch to (R) 1-3 or (R) 4-10, depending upon target range.
		Note: The time period in which the tracker power switch is in any position other than AUTO should be kept to a minimum.
10	M	Adjust HORIZ BIAS ADJ and VERT BIAS ADJ for alinement of horizontal and vertical circuits. Crossbars should be positioned on the center of the indicator score meter.
11	M	Set locking lever on HORIZ BIAS ADJ and VERT BIAS ADJ in the lock position.
12	M	Set TRACKER POWER switch to AUTO. *INFRARED XMTR indicator will extinguish and TRACKER INDICATOR SCORE crossbars will revert to an off-center position. Press reset switch.* Set INTERNAL POWER switch to OFF and notify maintenance.
13	LET	Notify gunner to cease tracking.
14	TRAN	Notify transmitter operator to turn off transmitter.
15		Proceed with training exercise.

g. Open the breech (fig 5-3).

(1) Disengage the breechblock by pulling the breech lock release lever back and down. This releases the breechblock so that it may be opened (A, fig 5-3).

(2) Pull the breechblock back and up to the open position. This cocks the firing mechanism and automatically engages the safety mechanism and positions the M64 cartridge for manual extraction (B, C, fig 5-3).

h. Close the LET breech.

(1) Pull the breechblock down to the closed osition (D, fig 5-3).

(2) Push the breechblock release lever up to the *tched* position (D, fig 5-3).

i. Lift the safety lever to the ARM position.

j. Depress the tracker trigger safety plunger and queeze and hold the tracker trigger lever.

5. Infrared Transmitter Preparation. *a. Installation.* Insure that the infrared transmitter has een installed on the target vehicle as prescribed in aragraphs 5-7 through 5-13.

b. Equipment Safety. Before starting the target source, the lamp cover must be removed. Leaving the cover in place may result in overheating and subsequent lamp failure. The cover is removed by turning the four winged fasteners. Secure the lamp cover in a convenient place on the target vehicle.

c. Operation and Checkout Procedures.

(1) *Controls and indicators.* The controls and indicators of the power supply/modulator are illustrated in figure 5-20 and explained in table 5-1.

(2) *Turn on and checkout.*

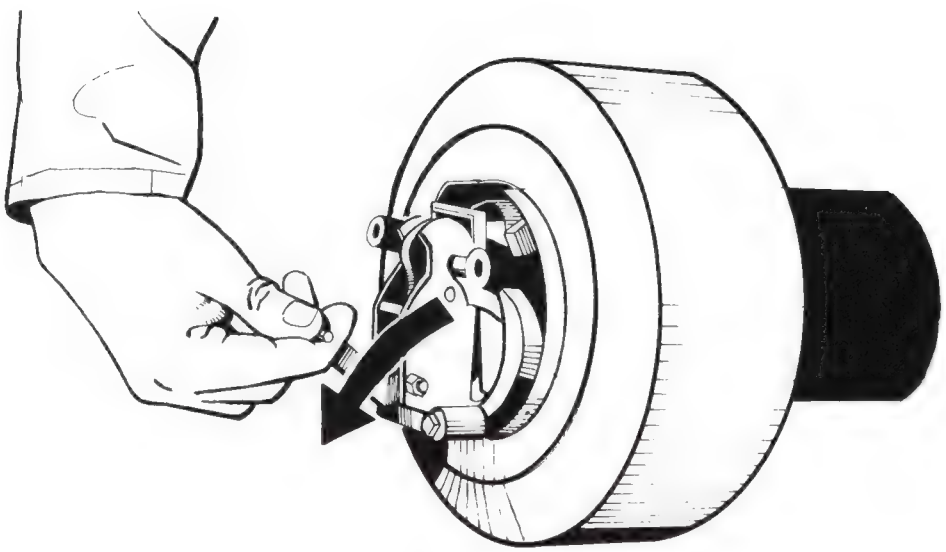


Figure 5-3. Opening and closing the breech.

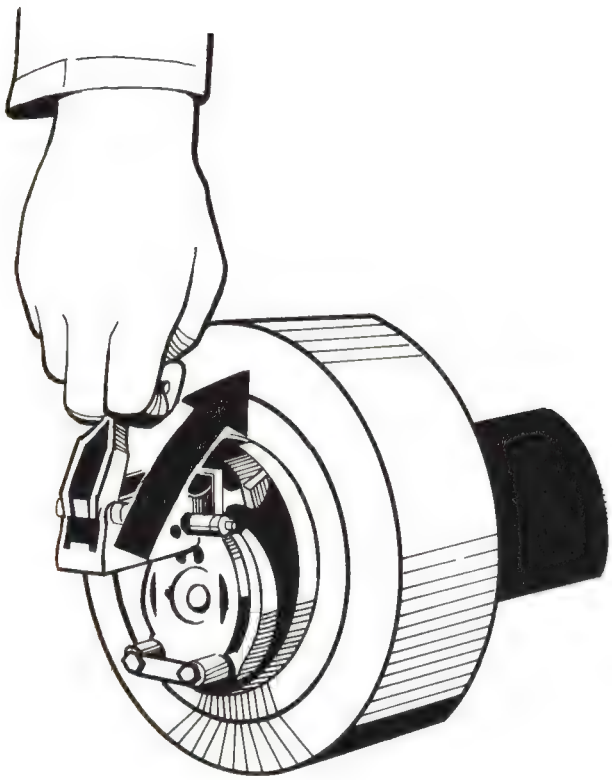


Figure 5-3—Continued.

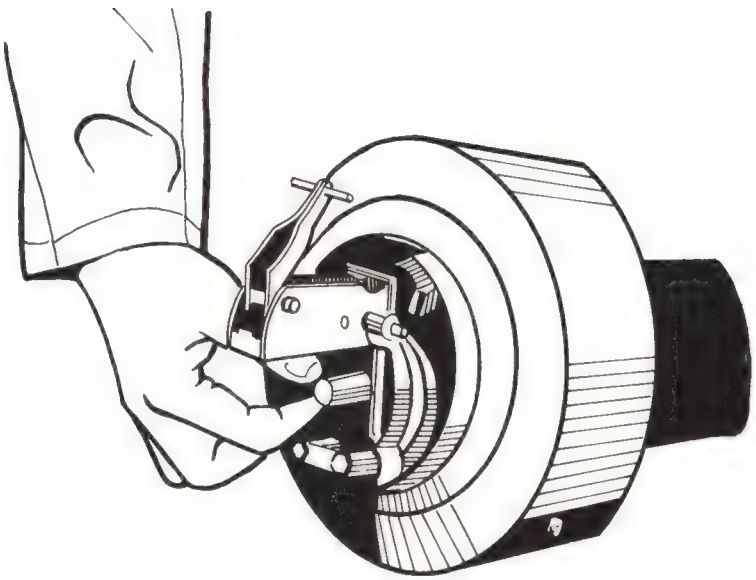


Figure 5-3—Continued.

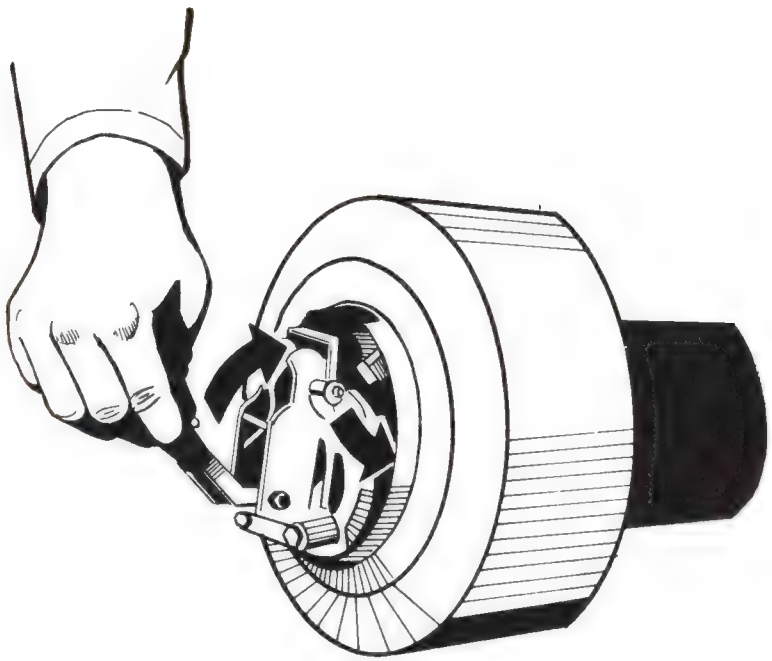


Figure 5-3—Continued.

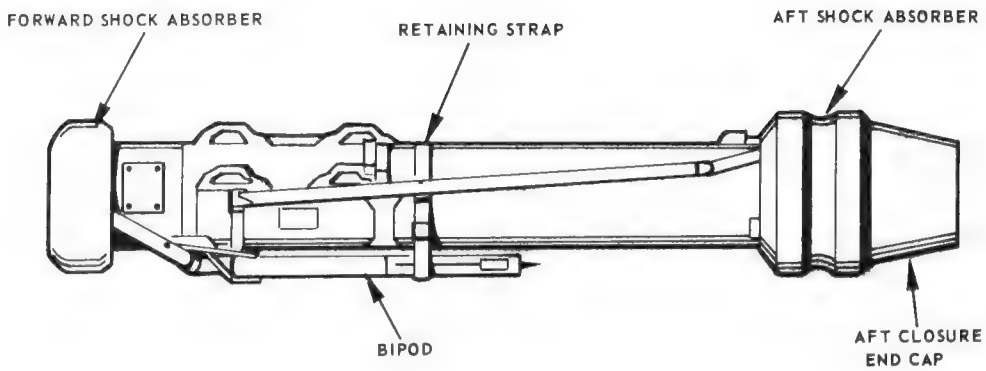


Figure 5-4. Launch effects trainer.

(a) Set the 24-volt DC 40-amp INPUT circuit breaker (CBI) on the power supply/modulator to ON and wait for an in-band reading on the OPERATING RANGE meter. The reading will decrease to approximately mid-scale after the lamp lights.

(b) Raise the RED protective cover then hold the LAMP START switch in the UP position.

(c) Observe the appearance of ON in LAMP MOD indicator window. Release LAMP START switch.

(3) *Malfunctions.* There are two indications of malfunctions in the infrared transmitter.

(a) The OPERATING RANGE meter fails to read within the band. If this occurs, replace the power supply/modulator (para 2-12). If this fails to correct the malfunction, replace the power supply/modulator battery cable.

(b) The LAMP MOD indicator fails to read ON while OPERATING RANGE meter reads within the band. If this indication occurs, replace the target source (para 2-12). If the indication persists after replacing the target source, then replace the power supply/modulator. If this fails to correct the malfunction, replace the target source cable.

(4) *Turn-off procedure.* To turn the infrared transmitter off, set the 24-volt DC 40-amp INPUT circuit breaker (CBI) on the power supply/modulator to OFF.

Caution: **Do not remove connector from target source while lamp is operating. Contact arcing may occur.**

5-6. Performing Tracking Exercise. *a. Infrared Transmitter Operation.* The infrared transmitter emits an infrared signal which is received and processed by the tracker. The normal effective detection range of the infrared signal is 300 meters. The procedure to be followed in operating the infrared transmitter is given in paragraph 5-5.

b. Monitoring Set Operation.

Note: When the monitoring set is operated with the tracker bias switch in the manual position, the monitoring set must be alined in accordance with table 5-1.

(1) If the internal batteries of the monitoring set are to be used for monitoring set operation, place the

INTERNAL power switch to ON and insure the EXTERNAL power switch is OFF. If an external power source is being used, place the EXTERNAL power switch in the DC or AC position, depending on the type of external power being used, and insure the INTERNAL power switch is OFF.

(2) Set TARGET RANGE switch to the simulated target range.

(3) Set the TARGET SIZE switch to the position corresponding to the type of target (moving or stationary).

(4) Set the TRACKER BIAS switch to the MANUAL position if the monitoring set has been alined for use with targets at known ranges. If the target range is not known, set TRACKER BIAS switch to the AUTOMATIC position.

(5) Insure the TRACKER POWER switch is set to the AUTO position.

(6) Notify the infrared transmitter operator to set the MODE switch to the OPERATE position.

(7) When the LET is fired, observe the following monitoring set control panel indicators and insure that the:

(a) TRIGGER indicator illuminates.

(b) INFRARED XMTR indicator illuminates.

(c) TRIGGER indicator extinguishes (after approximately .5 seconds).

(d) TRACKER INDICATOR SCORE crossbars indicate the gunner's tracking performance throughout the tracking exercise.

(8) Observe the following indicators upon completion of the tracking exercise:

(a) INFRARED XMTR indicator extinguishes.

(b) HIT or MISS indicator illuminates indicating whether or not the gunner's aim was outside the Dragon tactical round performance limitations.

(c) TRACKER INDICATOR SCORE crossbars indicate a numerical summation of the gunner's vertical and horizontal tracking errors.

(9) If a MISS is scored, review the training run results with the gunner by rotating the TARGET RANGE switch counterclockwise, stopping at each range segment. At each segment in which the gunner's aim was outside the performance limits of the Dragon tactical round, the appropriate OFF TARGET quadrant(s) will illuminate.

(10) Record the gunner's tracking results on the individual score card.

c. LET operation.

(1) Assistant gunner will:

(a) Open the breech and reset the weight shift mechanism as described in paragraph 5-4*f*.

(b) Install an M64 grenade cartridge in the chamber.

Note: When the breechblock release lever is rotated to the down position, it automatically places the safety lever in the safe position.

(c) Close the breech as described in paragraph 5-4*g*, and raise the safety lever to the ARM position. Notify the gunner that the LET is ready to fire.

(2) The gunner will—

(a) Locate the target; then aline the tracker optical sight crosshairs on the center of target board.

(b) Depress the tracker safety plunger and squeeze the tracker trigger lever.

(c) Recover the original point of aim as rapidly and smoothly as possible after simulated missile launch, and maintain a steady track until the termination of the tracking exercise.

(3) The assistant gunner, at the termination of the tracking exercise, will reset the weight shift mechanism and open the breech. The cartridge extractor in the breech will position the cartridge for manual extraction. Reload the LET as prescribed in (1) above.

(4) The gunner will review his tracking exercise with the monitoring set operator.

Section II. INSTALLATION AND REMOVAL OF INFRARED TRANSMITTER

5-7. General. Instructions in paragraph 5-9 must be observed in installing the infrared transmitter on the M151 ¼-ton truck, M60A1 tank, M113 armored personnel carrier and the M561 Gamma Goat. Paragraphs 5-10 through 5-13 provide instructions for installing the target mounting kit on each of the four vehicles. Paragraph 5-13 lists the procedures for installing the infrared transmitter on the target mounting kit.

5-8. Prior to Installation. Before proceeding with installation on vehicles, the pedestal (6, fig 5-10) must be installed on the universal adapter plate (3, fig 5-10) using eight bolts, flat washers, lockwashers, and nuts (13, 14, 15, 16, fig 5-10).

5-9. Target Mounting Kit and Power Supply/Modulator Installation, M151 ¼-Ton Truck (Fig 5-5). *a.* Carefully tag, or otherwise identify, and retain all parts and assemblies removed from the M151 ¼-ton truck.

b. Remove the rear seat and associated hardware or fold seat to the upright position.

c. Install the target mounting kit as shown in

ure 5-5, using straps, FSN 1670-937-0271. Make tain straps are securely attached and tightened.

l. Install the power supply/modulator battery ble on the vehicle batteries as described in agraph 5-13*f* and shown in figure A, 5-7.

e. Install the power supply/modulator in the front ssenger seat and secure by passing the safety ap through the carrying handle as shown in figure .

f. Install the remaining components of the infrared nsmitter and connect the target source cable as scribed in paragraph 5-13*d*.

Caution: **When operating the vehicle, riodically check the tightness of the straps. tighten the straps as necessary.**

0. Target Mounting Kit and Power Supply/ Modulator Installation, M60A1 Tank (Fig 5-6).

Note: Before the target mounting kit can be installed, the M36 scope, periscope mount screws, the canvas cupola cover, the e top screws in the ballistic shield must be removed. These s should be stored in the oddment tray.

a. Position the two ½-inch spacer bars (10275590-nd 10275590-3) over the M36 periscope mounting es as shown in figure 5-6. Next, position the 1-inch spacer bar (10275590-1) over three mounting holes on the ballistic shield as shown in figure 5-6.

b. Carefully place the universal adapter plate over the spacer bars so that the mounting holes on the universal adapter plate are alined with those on the commander's cupola. Insure that the clearance holes in the universal adapter plate are positioned over the three mounting studs for the caliber .50 gun shield.

c. Insert nine ½ X 3½-inch bolts, using a lock-washer and flat washer under the bolt head, into the mounting holes as shown in figure 5-6. Make certain that the bolts are inserted through the spacer bars, then tighten the bolts securely.

d. Insert the ½ X 2½-inch bolts through the universal adapter plate and spacer bars as shown in figure 5-6. Use a flat washer under each bolt head, and a flat washer and nut on the underside of the universal adapter plate. Tighten the three bolts securely.

e. Install the power supply/modulator in the radio rack space located behind the commander's seat.

f. Connect the power supply/modulator battery cable to the vehicle batteries as shown in figure 5-7. Install the remaining components of the infrared transmitter as described in paragraph 5-13.

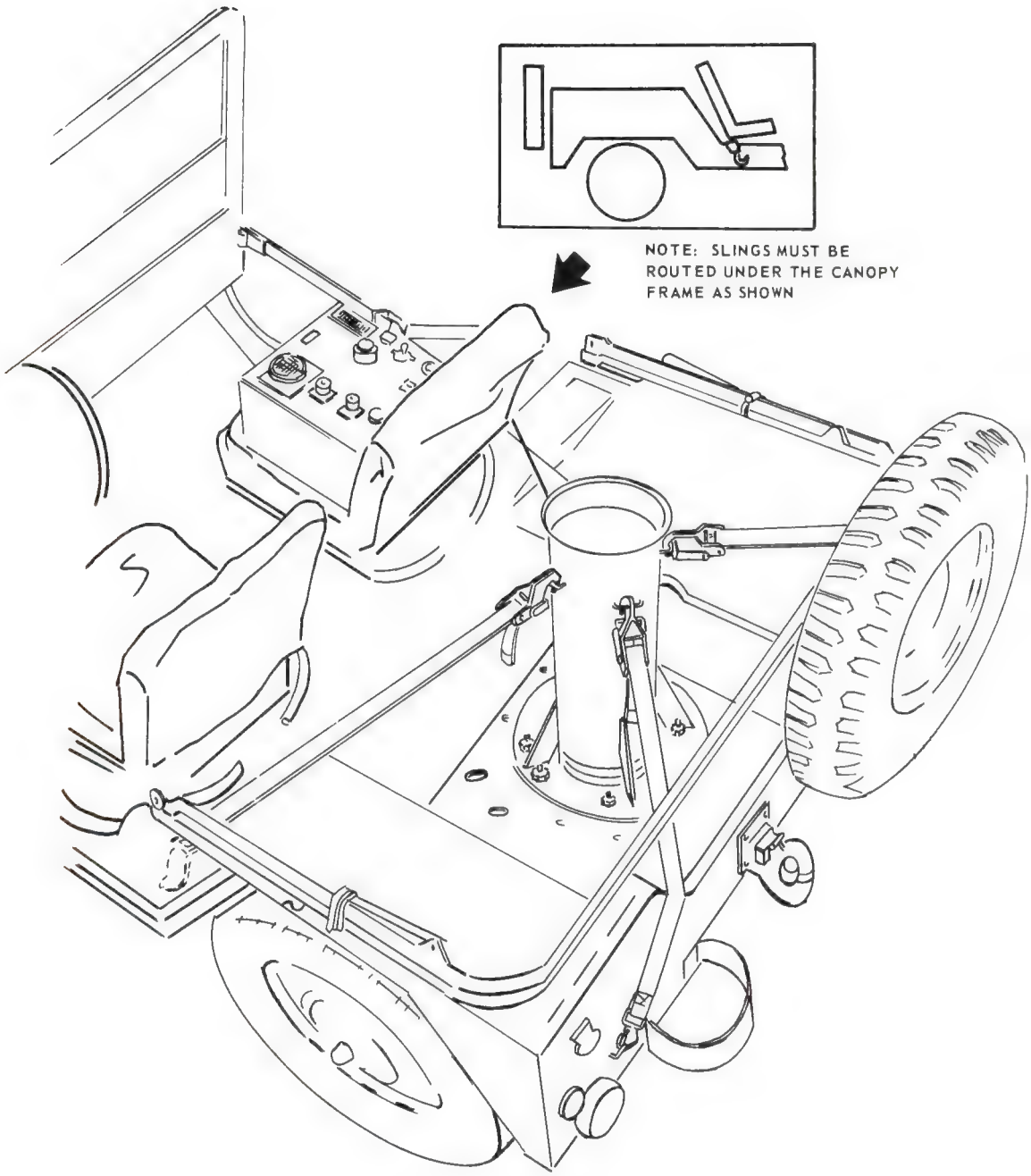


Figure 5-5. Target mounting kit and power supply/modulator installation, M151 ¼-ton truck.

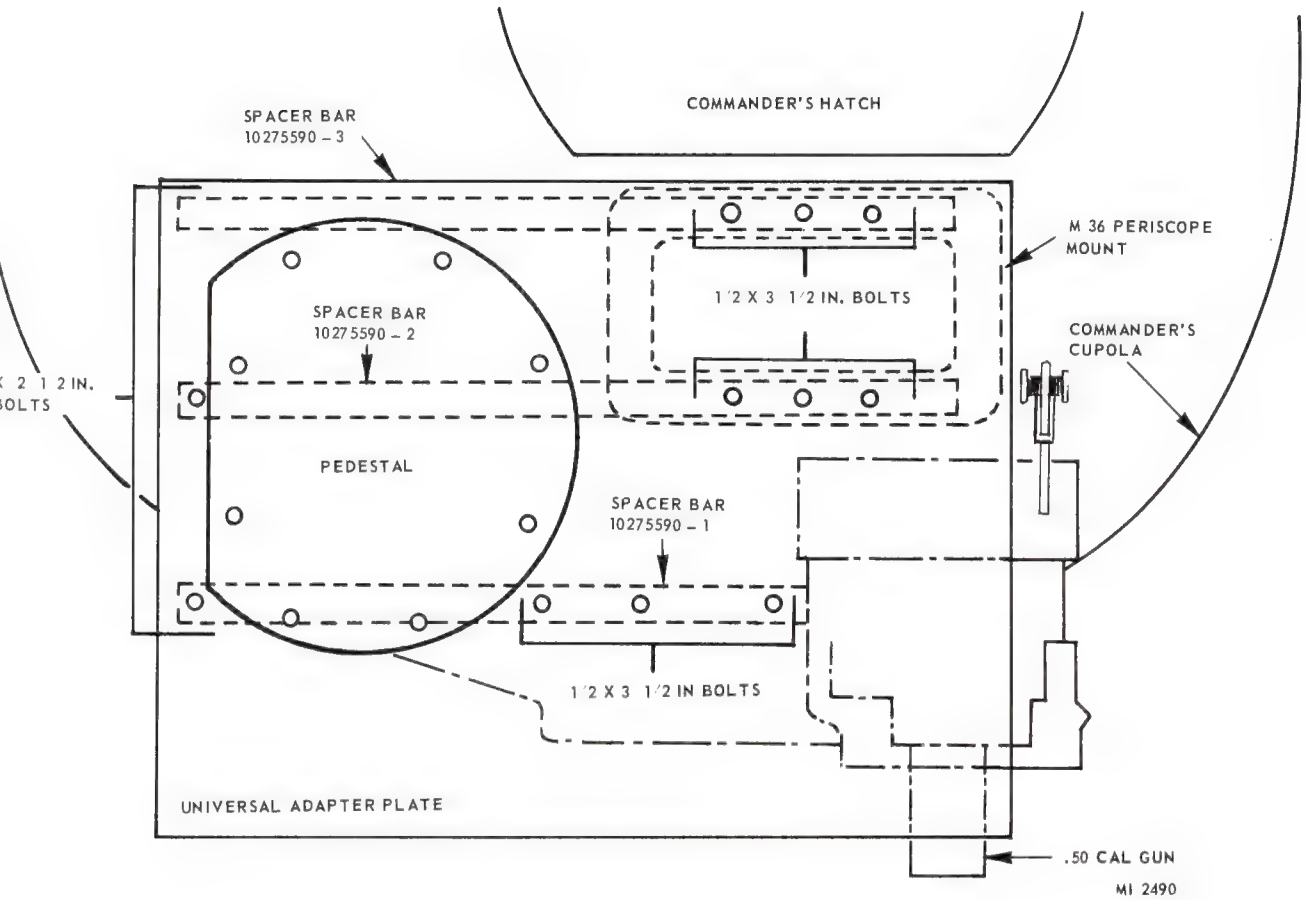
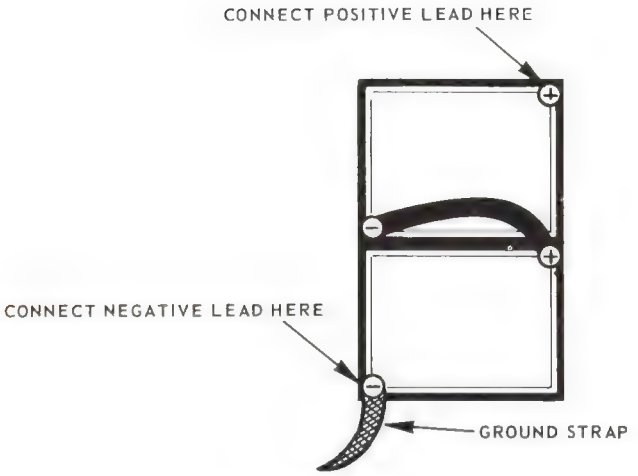
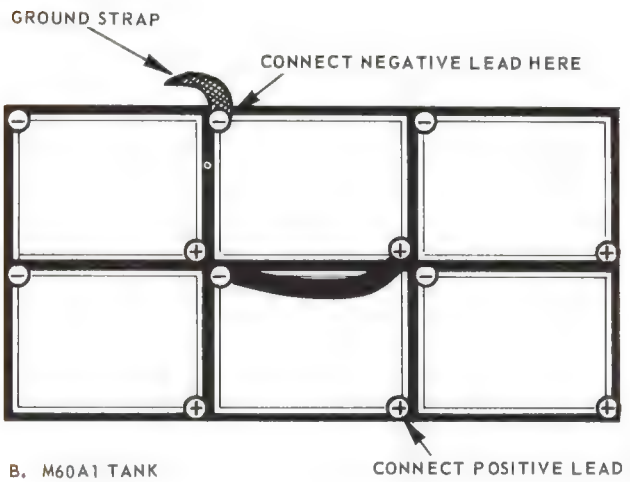


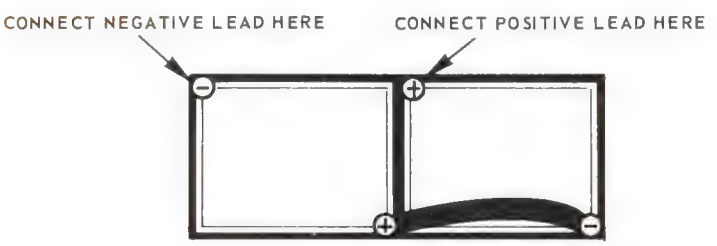
Figure 5-6. Target mounting kit installation, M60A1 tank.



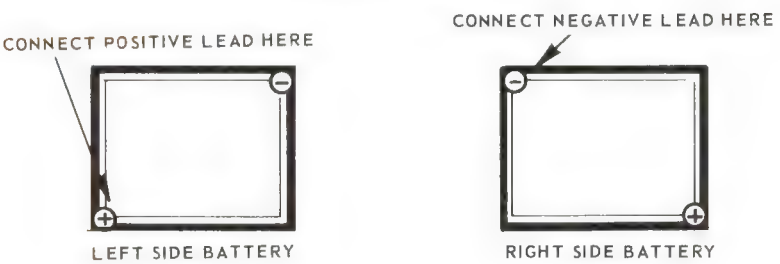
A. M151, ¼ TON TRUCK



B. M60A1 TANK



C. M113, ARMORED PERSONNEL CARRIER



D. M561, GAMMA GOAT

Figure 5-7. Power supply/modulator battery cable connections.

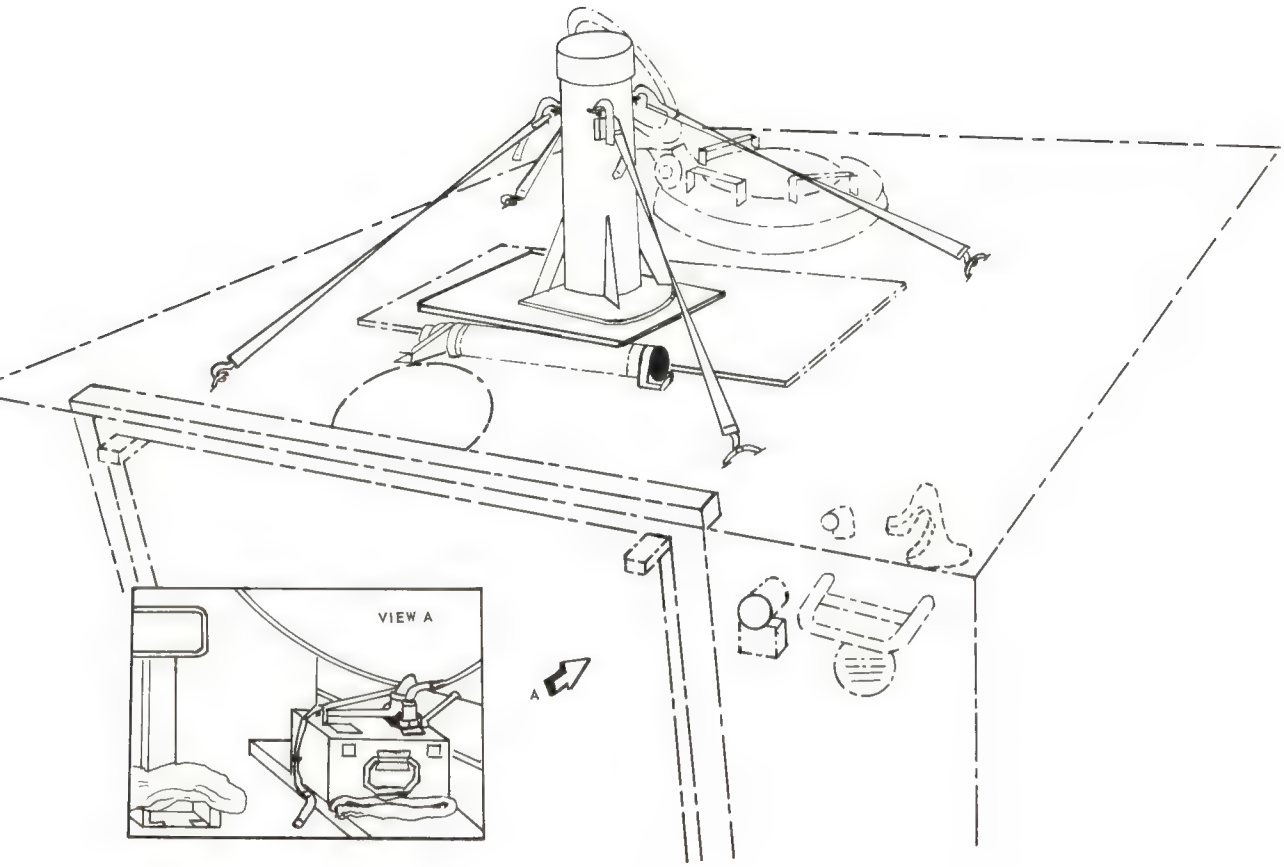


Figure 5-8. Target mounting kit and power supply/modulator installation, M113 armored personnel carrier.

1. **Target Mounting Kit and Power Sup- / Modulator Installation, M113 Armored sonnel Carrier (Fig 5-8).** *a.* Install the target unting kit as shown in figure 5-8, using straps N 1670-937-0271. Make certain that the straps are urely attached and tightened.

. Install and secure the power supply/modulator he right hand passenger seat as shown in figure 5-

. Install the remaining components of the in- ed transmitter and connect the cables as cribed in paragraph 5-13.

. Install the power supply/modulator battery nections as shown in figure 5-7.

Caution: **When operating the vehicle, iodically check the tightness of the straps. tighten straps as necessary.**

2. **Target Mounting Kit and Power Sup- / Modulator Installation, M561 Gamma Goat g 5-9).** *a.* Install the target mounting kit as shown igure 5-9 using straps FSN 1670-725-1437. Slide the universal adapter plate forward until it is flush against the front bulkhead. Tighten the front straps first, until the rear of the universal adapter plate raises approximately ¼-inch off the floor. Next, tighten the rear straps until the universal adapter plate is flush with the floor. Make certain that straps are securely attached and tightened.

b. Install and secure the power supply/modulator in the right front seat and secure it with available straps or slings.

c. Install the remaining components of the infrared transmitter and connect the cables as described in paragraph 5-13.

Caution: **When operating the vehicle, periodically check the tightness of the straps. Retighten straps as necessary.**

5-13. Installation of Infrared Transmitter on the Target Mounting Kit (Fig 5-10). *a. Installation of Pedestal.* The pedestal must be installed on the universal adapter plate prior to mounting the plate on the vehicle as described in paragraph 5-8.

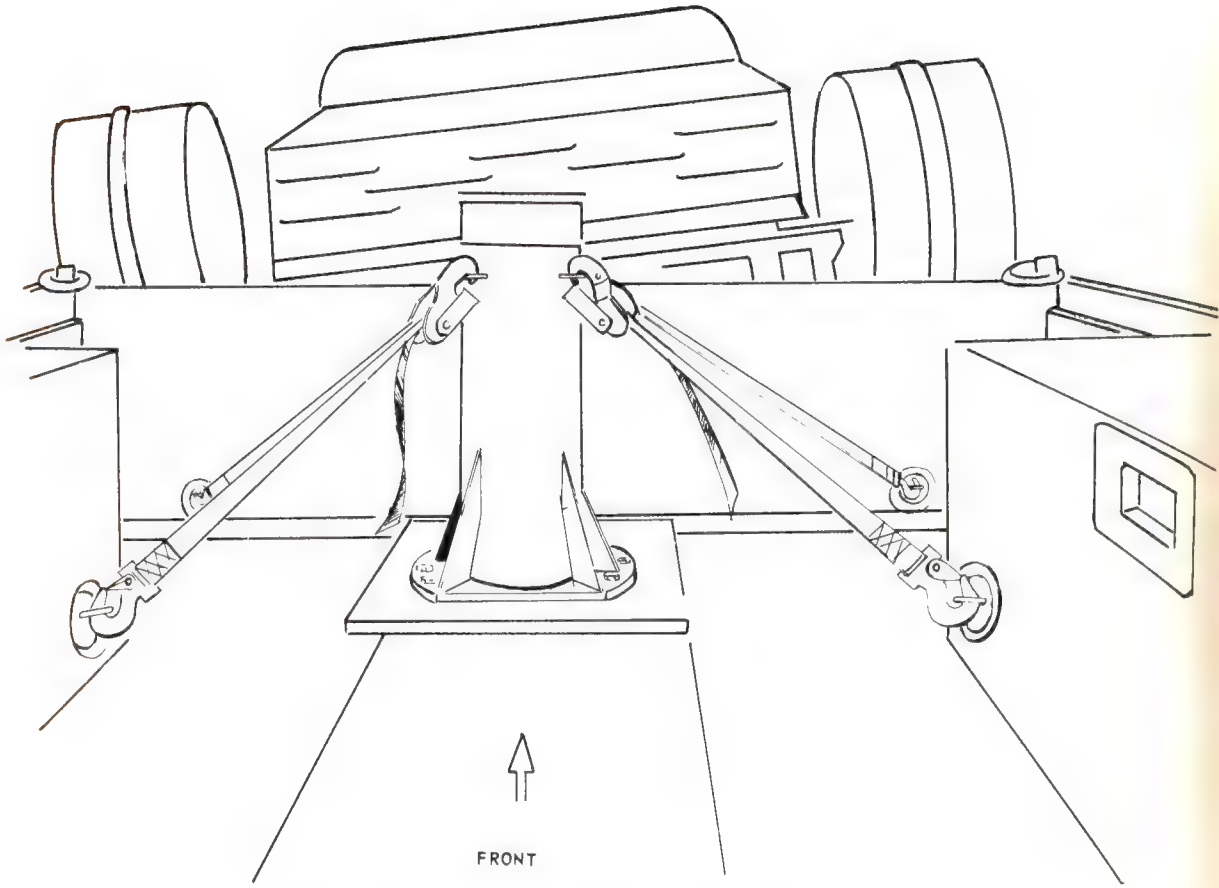
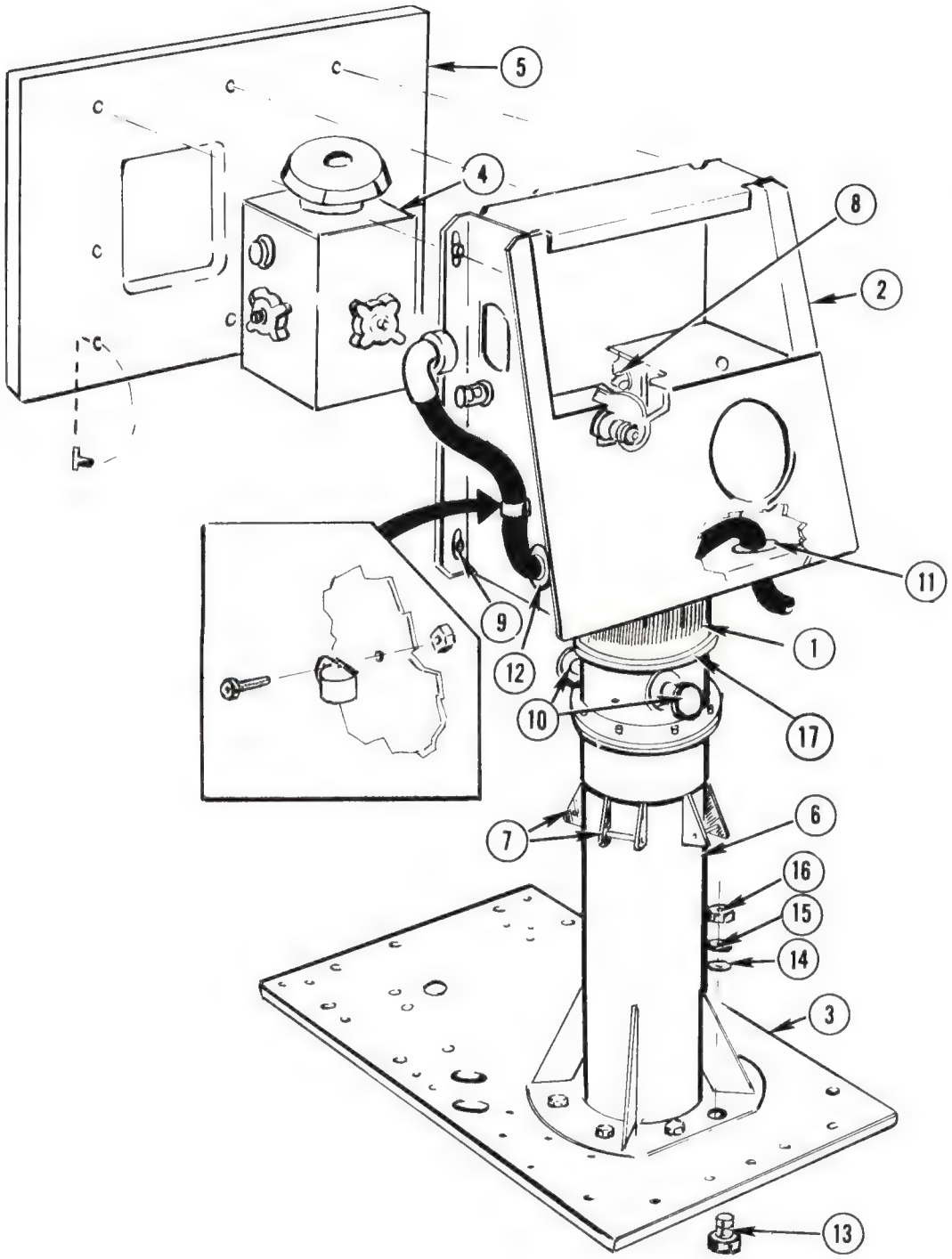


Figure 5-9. Target mounting kit installation, M561 Gamma Goat.



1. ADAPTER
2. SUPPORT
3. UNIVERSAL ADAPTER PLATE
4. TARGET SOURCE
5. TARGET BOARD
6. PEDESTAL
7. TIE DOWN BRACKET (4)
8. CAPTIVE BOLTS (3)
9. CAPTIVE NUTS (8)
10. LOCKING ASSEMBLY (3)
11. CABLE ENTRY HOLE
12. CABLE EXIT HOLE
13. BOLT (8) MS 35308–415
14. FLAT WASHER (8) MS 15795–818
15. LOCK WASHER (8) MS 35338–143
16. NUT (8) MS 35650–3392
17. MORMON CLAMP

Figure 5-10. Infrared transmitter installation.

Warning: **DO NOT attempt to disassemble the target source. The ARC lamp is pressurized and could explode if handled carelessly.**

b. Installation and Removal of Support and Adapter on Pedestal.

Caution: **To avoid damage to the adapter or pedestal make certain that the three locking assemblies (10, fig 5-10) are disengaged and the locking pins are not protruding into the interior of the pedestal.**

(1) Disengage the three locking assemblies (10, fig 5-10) by pulling the knurled knob straight out and then twisting the knob to the left or right so that the lock pin remains flush with the interior wall of the pedestal.

(2) Insert the base of the adapter (1, fig 5-10) into the inside neck of the pedestal until the bottom flange of the adapter rests on the top flange of the pedestal.

(3) Engage the three locking assemblies by turning the knobs until the detents fall into two notches. Carefully check the adapter (1, fig 5-10) and support (2, fig 5-10) to make sure they are securely held to the pedestal.

(4) Remove by disengaging the three locking assemblies as described in (1) above and lifting the adapter and support off the pedestal.

c. Installation and Removal of Target Board.

(1) The target board must be positioned with the painted target side away from the support and with the opening in place over the target source or its cavity. Secure the target board to the support using the eight captive bolts (fig 5-10).

(2) Remove by reversing the installation procedure.

d. Connection and Removal of Target Source Cable.

Caution: **DO NOT connect the cable between the power supply/ modulator and the target source until the target assembly is installed.**

(1) Insert the target source cable W1P2 through the hole (11, fig 5-10), in the bottom of the target support and then through the hole (12, fig 5-10), in the side of the target support.

(2) Remove the clamp (17, fig 5-10) from the target support. Stretch the clamp and place it around the target source cable. Bolt the clamp back to the target support.

(3) Be sure that the 24-volt DC 40-amp INPUT circuit breaker CBI on power, supply/modulator is in the OFF position. Connect W1P1 cable to the target source into the power supply/modulator LAMP PWR jack J1.

Caution: **DO NOT attempt to connect or disconnect the target source cable from the power supply/ modulator when CBI is in the ON position. Arcing can occur.**

(4) Store surplus target source cable coiled in the target support.

(5) The target source cable can be removed by reversing the installation procedures. Insure that 24-volt DC 40-amp INPUT circuit breaker CBI is in the OFF position.

e. Installation and Removal of Target Source. The target source (4, fig 5-10) may be installed in or removed from the support (2, fig 5-10) with or without the target board (5, fig 5-10) in place.

(1) Place the target source in the cavity provided in the support. The lamp should face the target board.

(2) Tighten the three captive bolts (8, fig 5-10) using a 3/4-inch socket wrench. Do not over tighten.

Caution: **Leave the lamp cover in place during installation or removal to protect the lamp while handling.**

(3) Before removing the target source from the support, set the 24-volt DC 40-amp INPUT circuit breaker CBI on the power supply/modulator to the OFF position. Disconnect the target source cable W1. Removal procedure is the reverse of installation.

f. Installation and Removal of the Power Supply/Modulator Battery Cable.

Caution: **When connecting battery cable observe polarity as directed in steps (1) and (2). DO NOT touch the battery terminals to metal parts of the vehicle because arcing can occur.**

(1) Connect the positive (+) lug on the power supply/modulator battery cable to the positive (+) terminal of the battery. (On the M561 connect the positive lug to the positive terminal on the vehicle left side battery.)

(2) Connect the negative (—) lug on the power supply/modulator battery cable to the negative (—) terminal of the battery. (On the M561 connect the negative lug to the negative terminal on the vehicle right side battery.)

(3) Insure that the 24-volt DC 40-amp INPUT circuit breaker CBI is in the OFF position.

(4) Connect W2P1 power supply/modulator battery cable to J3 in the power supply/modulator.

(5) To remove the power supply/modulator battery cable, reverse the installation procedure. Insure that the 24-volt DC 40-amp INPUT circuit breaker CBI on the power supply/modulator is in the OFF position.

Section III. OPERATION AND CHECKOUT

-14. Preliminary Safety Precaution. *a. Equipment Safety.*

(1) Before starting the target source, the amp cover must be removed. Leaving the cover in lace may result in overheating and subsequent amp failure. The cover is removed by turning the our winged fasteners. Store the lamp cover in a onvenient place on the target vehicle.

(2) To prevent damage to the target assembly r pinching of the cable, the commander's hatch n the M113 APC and the M60A1 tank must emain latched open when the infrared transmitter is installed.

(3) The three locking assemblies (10, fig 5-10) nust securely engage the adapter (1, fig 5-10) whenever the infrared transmitter is in use or eing transported.

b. Personnel Safety. The target source emits nfrared radiation which can cause severe eye damage to personnel within the danger zone. Figure 5-11 describes the danger zone.

Warning: **Personnel must not look at the arget source through vehicle mirrors or any ther reflecting surface.**

-15. Operation and Checkout Procedures for Controls and Indicators. The controls and indicators of the power supply/modulator are illustrated in figure 5-12 and explained in table 5-

Caution: **DO NOT Remove the connector rom the target source while the lamp is perating. Contact arcing may occur.**

Caution: **To prevent damage to the high voltage power supply, the lamp start switch should not be held in the UP position for more than 15 seconds.**

-16. Troubleshooting. There are two indications f malfunctions in the infrared transmitter.

a. The OPERATING RANGE meter fails to ead within the band. If this occurs, replace the power supply/modulator (para 5-13). If this fails o correct the malfunction, replace the power upply/modulator battery cable.

b. The LAMP MOD indicator fails to read ON while the OPERATING RANGE meter reads within the band. If this indication occurs, replace he target source (para 5-13). If the indication persists after replacing the target source, then replace the power supply/modulator. If this fails o correct the malfunction, replace the target source cable.

-17. Battery Charging Procedure for Monitoring et. The monitoring set houses its own self-contained nickel cadmium batteries which are rechargeable. Use the following procedure to recharge the monitoring set batteries (fig 2-18).

a. Set the EXTERNAL POWER switch to OFF. Set the SELECTOR switch to OFF. Connect the power cable W1P2 to the POWER INPUT receptacle 1A1A1.

(1) When using an 18/30 volt DC power source, connect W3P2 to W1P1. Connect W3P1 to the power source (fig 5-2). Place the vehicle master electrical control switch to blackout drive ON position.

(2) When using a 105/130 volt AC 50/400 cycle power source connect power cable W4P2 to W1P1. Connect W4P1 to the power source (fig 5-2).

(3) When using 190/230 volt AC 50/400 cycle power source connect power cable W5P2 to W1P1. Connect W5P1 to the power source (fig 5-2).

b. Set the EXTERNAL POWER switch to the appropriate position, AC or DC.

c. Place the METER SELECTOR SWITCH to the AMPS position. A lower green band reading will be indicated. If not, recheck the external power source and all connections, and switch on the battery charging panel.

d. Set the SELECTOR switch to —VOLTS. The METER will indicate within the operate zone (upper green band) when the batteries acquire 50 percent or more full charge.

e. Set the SELECTOR switch to + VOLTS. The METER will indicate within the operate zone (upper green band) when the batteries acquire 50 percent or more full charge. Set the METER SELECTOR SWITCH to OFF.

f. When the temperature is between + 54 degrees F and + 110 degrees F, about 16 hours of charging is required to bring the batteries from a fully discharged state to a completely (100 percent) charged state. About 8 hours of charging is required to bring the batteries to 80 percent of full charge. The batteries may be continuously charged for an indefinite period without causing damage to the batteries or battery charger.

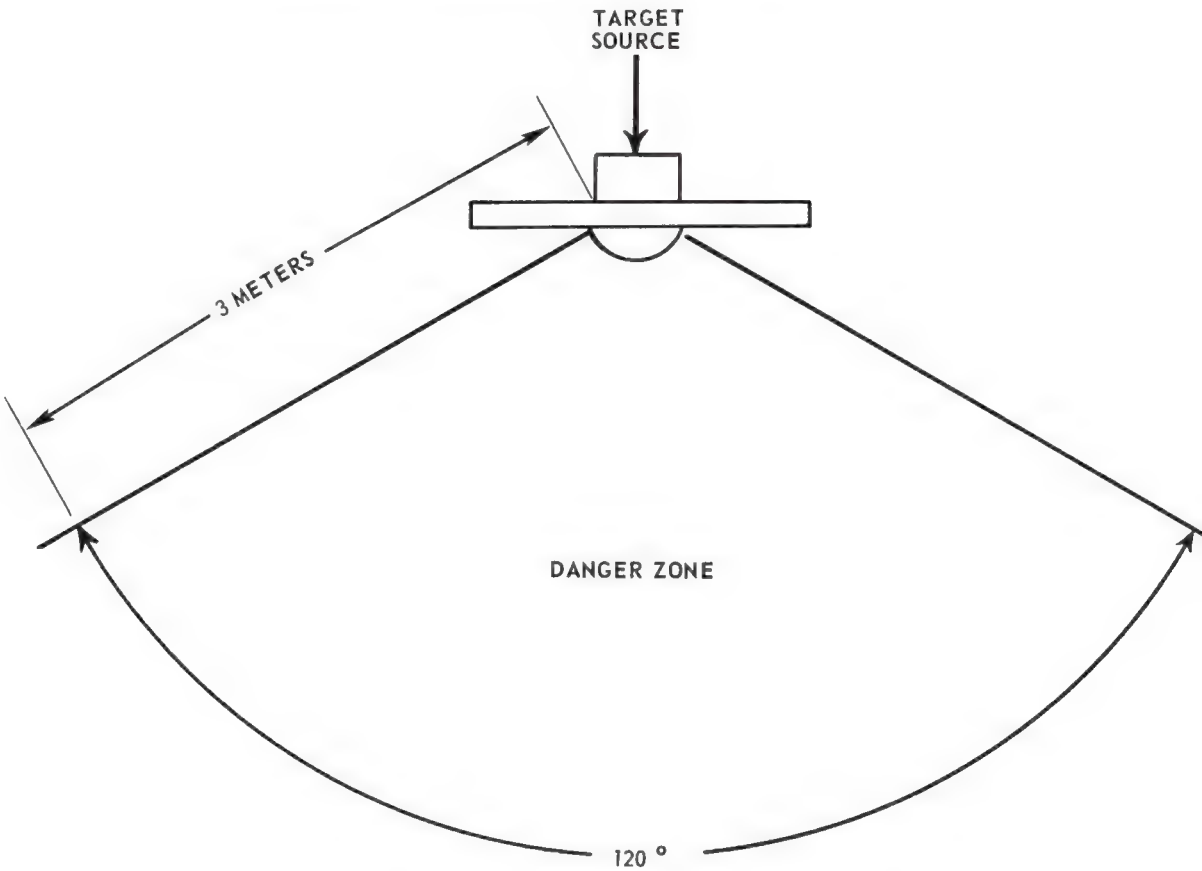
Note: With the batteries in a fully charged state, under normal operating conditions, a minimum of 200 tracking exercises can be accomplished.

g. When the batteries are charged, set the EXTERNAL power switch to OFF and disconnect the power cables.

5-18. Dragon Field Handling Trainer (Fig. 5-13).

a. Description. The Dragon field handling trainer is an inert round which simulates the Dragon tactical round in weight and configuration. The

WARNING: PERSONNEL MUST NOT ENTER DANGER ZONE WHILE TARGET SOURCE IS OPERATING. SERIOUS EYE BURN CAN RESULT.



NOTE: DANGER ZONES EXTEND THROUGH ELEVATION ANGLE OF 45 DEGREES.

Figure 5-11. Target source danger zones.

field handling trainer is used in place of the Dragon tactical round and LET when conducting field handling exercises, in order to prevent unnecessary damage to the tactical round and LET. The Dragon tracker will be used in conjunction with the field handling trainer.

b. Assembly of the Field Handling Trainer. The field handling trainer is assembled at the using organization by installing a special missile weight kit XM-8 in an expended launcher. The missile weight kit required for field handling train fabrication consists of an aluminum weig assembly, three lockwashers and screws, a replacement aft shock absorbers. The kit will issued as a Table of Distribution and Allowa ces/Table of Allowances line item. The fie handling trainer will be marked with a painted inch bronze band and the word EMPTY in 1-in white letters.

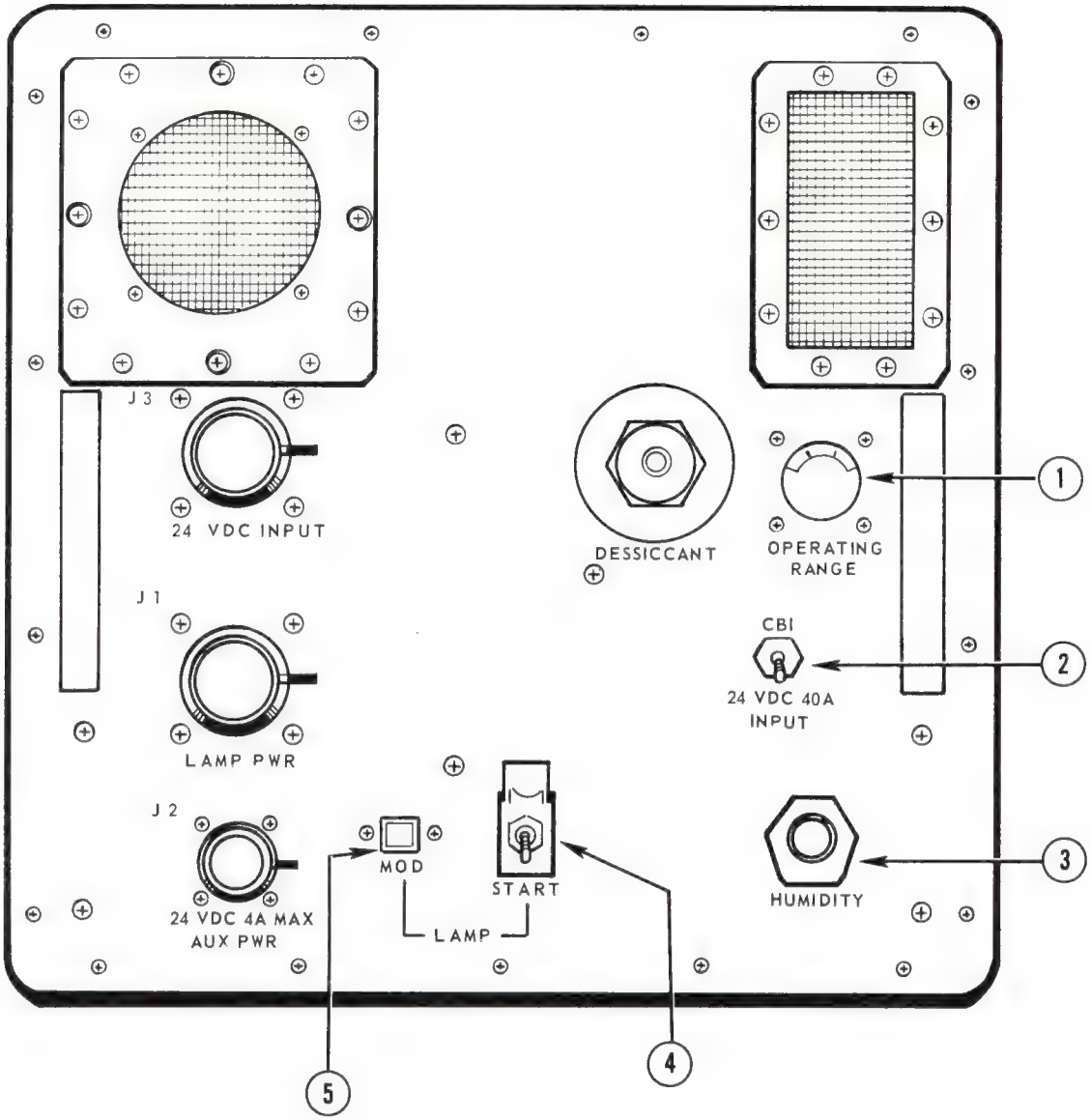


Figure 5-12. Power supply/modulator control panel.

Table 5-1. Power Supply/Modulator Controls and Indicators (fig. 5-12)

Key	Control or Indicator	Function
1	OPERATING RANGE meter	Indicates lamp duty cycle circuitry in power supply/modulator ready for lamp start.
2	24 V DC 40 A INPUT circuit circuit breaker CB1.	Applies vehicle battery power to power supply/modulator; protects against overloads.
3	HUMIDITY indicator	Color indicates humidity.
4	LAMP START switch	Applies power to high voltage starting circuit and connects low voltage starting circuit to lamp for initial firing.
5	LAMP MOD indicator	Shows that lamp is on by the appearance of the word ON or shows that lamp is not operating by appearance of the word OFF.

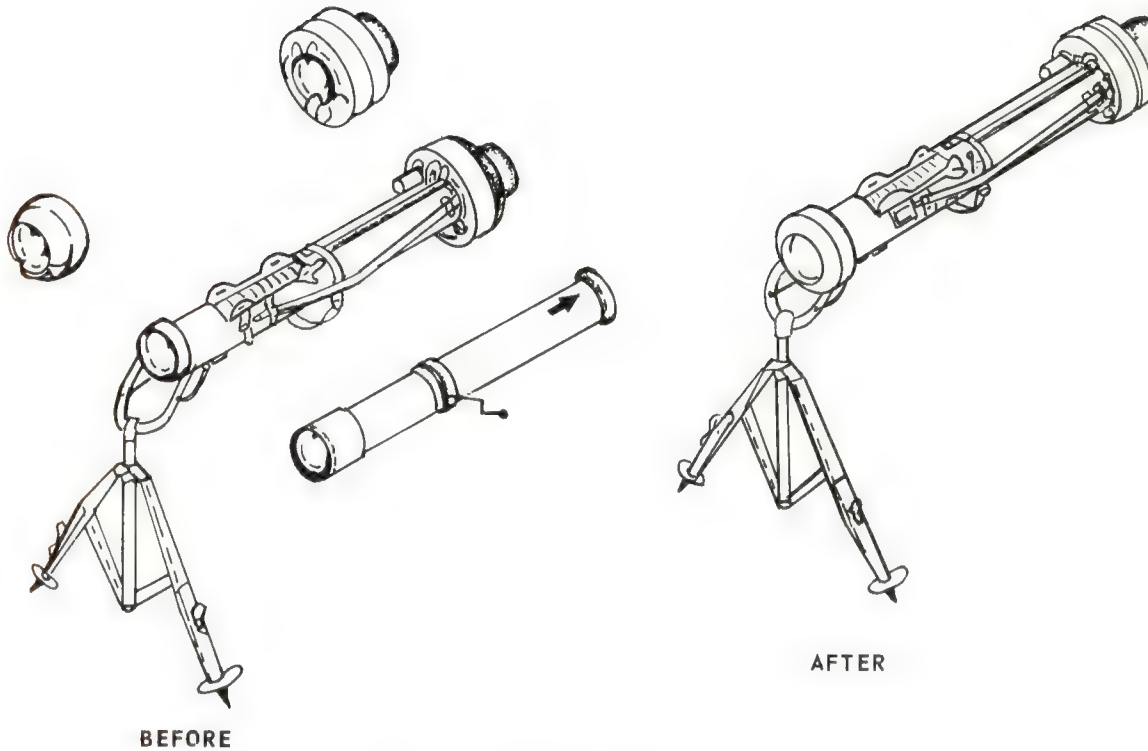


Figure 5-13. FHT assembly.

CHAPTER 6

TECHNIQUE OF FIRE

Section I. GENERAL

1. **Introduction.** Technique of fire is the method ed to deliver and control effective fire. Since no o situations are exactly alike, no single method ll apply to all situations. This chapter discusses e techniques a Dragon gunner uses to engage a rget.

2. **Weapon Position.** The weapon can be positioned in defilade, on a forward slope, or on level ground. In all cases the weapon must have a clear field of fire along the alunching azimuth. The missile line-of-flight must be free of trees, brush, or other obstacles that would prevent the missile from reaching its target. The backblast area must be clear to prevent injury to the gunner.

Section II. RANGE DETERMINATION

3. **Range Determination.** *a. General.* Accurate nge determination is essential to Dragon gunnery cause of the range limitations and the time/space tor required for engaging moving targets. The nner must establish in his mind a maximum range e (out to 1000 meters) which follows a series of rain features beyond which he cannot engage a get. He establishes a minimum range line (no ser than 65 meters) within which he cannot gage a target. Range must also be determined to ected points within the sector of fire between the ximum and minimum range lines.

b. Stadia Lines. The stadia lines in the optical ht of the tracker are used to determine if the get is within the weapon's range. The stadia lines not provide range determination in meters, but dicate if the target is in or out of range (fig 4-2).

c. Methods of Range Determination. See FM 23- , chapter 2, for methods of range determination.

d. Binoculars. Binoculars, in conjunction with the l relation (WORM) formula, are useful in deter- ning ranges. To use this method select any object known size. Using the mil scale in the binoculars, easure the height or width of the selected object. en substitute in the mil relation formula. $R=\frac{W}{m}$

ere R equals range in thousands of meters, m uals width in mils, and W equals width of the ject in meters.

4. **Time/ Space Factors (Intervisibility).** *a. eneral.* The time/space factor is the time required the missile to reach its target before the target n move from one covered position to another (from adspace to deadspace). The gunner must be aware covered positions within his sector out to his ximum range of 1000 meters. He must be able to determine the distances between these positions and the distances from the firing position to all of these covered positions.

b. Time of Flight Factor. The gunner must keep in mind that the maximum flight time of the Dragon missile, while engaging a target at maximum range, is 10 seconds. The flight time of the missile will decrease about one second for each 100-meter decrease in range to the target.

(1) *Example A.* Flight time to a target at 1000 meters—10 seconds.

(2) *Example B.* Flight time to a target at 700 meters—7 seconds.

(3) *Example C.* Flight time to a target at 350 meters—3.5 seconds.

c. Speed of Target Factor. The gunner must remember that at a range of 100 meters the maximum speed a target can be moving, and the gunner can be reasonably assured of being able to maintain a steady track on the target, is 22 mph. If the speed of the target is less than 22 mph the ease of track is increased.

d. Distance Factor. A target will move approximately 100 meters in approximately 10 seconds moving at the maximum speed of engagement, 22 mph. The speed of the target must be determined to find the time the target will require to move between covered positions at any given range.

c. Application of Time/Space Concept. After manning a firing position, the gunner must take all the above factors into consideration as soon as possible, in relation to his assigned sector of fire. The gunner must always base his calculations on the assumption that the target will be moving at the maximum engagement speed. The gunner must

determine "fire" and "no fire" zones to his front to insure that if a missile is launched, the flight time to the target will be less than the time the target will be exposed between covered positions, to insure missile impact on the target.

(1) *Example A.* Range to target: 1000 meters
Distance between covered positions—250 meters
Maximum speed assumed —22
"Fire"— "No Fire": Fire

Explanation: A vehicle moving at 22 mph will cover approximately 100 meters in approximately 10 seconds (flight time to maximum range). Therefore, the gunner can be assured of missile/target intercept with about 150 meters of fire zone remaining.

(2) *Example B.* Range to target—500 meters
Distance between covered positions—30 meters
Maximum speed assumed—22 mph
"Fire"— "No Fire": No Fire

Explanation: A vehicle moving at 22 mph will cove approximately 50 meters in 5 seconds (flight time t 500 meter target). Therefore, the target would b under cover again before missile/target intercept

(3) *Example C.* Range to target—100 meter
Distance between covere positions—15 meters
Maximum speed assumed—2 mph
"Fire"- "No Fire": Fire

Explanation: A vehicle moving at 22 mph will cov approximately 10 meters in 1 second (flight time t 100 meter target). Therefore, the gunner can b assured of missile target intercept with about meters of fire zone remaining.

f. Range Card (Fig 6-1). The Dragon gunner, i order to insure accurate determination in the ap plication of the Time/Space Concept, must prepa when time permits, a range card reflecting "Fire and "No Fire" zones.

Note: To determine distance laterally across the gunner front, between two covered positions at a range of 1000 meter the left and right limits of the optical sight can be used. Th measures a distance of approximately 100 meters.

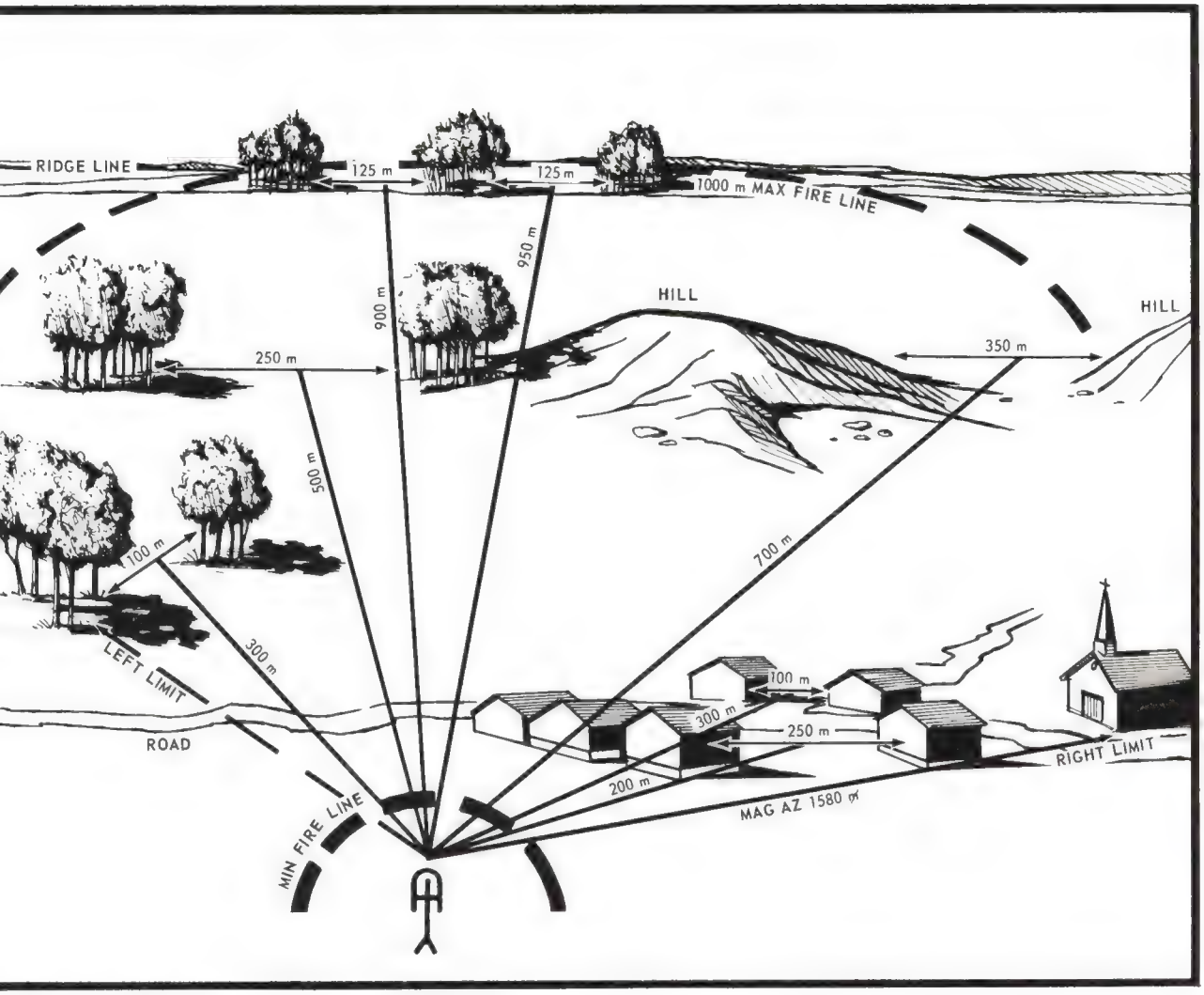


Figure 6-1. Dragon range card.

Section III. FIRE COMMANDS

5. General. *a.* Fire commands are the instructions sued to a Dragon gunner to engage a target. The quad leader will normally issue the fire commands. some cases, however, the time element involved ay require the gunner to issue the fire command.

b. There are two kinds of fire commands, initial d subsequent. Initial fire commands include all ta necessary for laying and firing the weapon. ubsequent fire commands include those commands sued to shift or cease fire. They include only those ements necessary to accomplish these actions.

c. A good fire command is as brief as clarity rmits. It includes all the elements needed to accomplish the fire mission and is given in proper sequence to accustom the crew to execute instruction in a logical order. It is given at a rate that permits receipt and application of instructions without confusion.

6-6. Sequence and Content of Initial Fire Commands. *a. Sequence.* The sequence prescribed for the initial fire command is —

(1) Alert.
(2) Prepare to fire.
(3) Target designation.
(4) Acquire and fire when ready.
(5) Cease tracking.

b. Alert. The alert is usually the first element of the initial fire command. It consists of the command

FIRE MISSION in the case of a stationary target or the command MOVING TARGET in the case of a moving target. The alert puts the Dragon gunner in readiness to execute a fire command with the least amount of delay.

c. Prepare to Fire. On the command PREPARE TO FIRE, the gunner deploys the bipod into its firing position, mates the tracker to the round, takes up his firing position, and removes the forward shock absorber (approximately 15 to 20 seconds).

d. Target Designation. The squad leader designates the target by giving a direction and other descriptive information. The squad leader designates targets with the word or words:

Tank (any armored vehicle).
Truck (any unarmored vehicle).
Antitank (any antitank gun or artillery piece).
Machinegun.
Troops.
Any other target (briefest descriptive form).

If several targets are in view, he designates the particular target or part of the target to be engaged, for example: LEADING TANK or LAST TANK.

e. Acquire and Fire When Ready. Upon command ACQUIRE AND FIRE WHEN READY, the gunner will select the point of aim, depress the safety and squeeze the trigger, and establish a smooth tracking rate to track the target.

f. Cease Tracking. Upon observing warhead detonation, the squad leader commands CEASE TRACKING. The gunner stops tracking and removes the tracker assembly from the expended launcher.

6-7. Examples of Initial Fire Commands.

a. Stationary Target. FIRE MISSION
PREPARE TO FIRE
TANK, RIGHT FRO
ACQUIRE AND FIRE
WHEN READY
CEASE TRACKING

b. Moving Target. MOVING TARGET
PREPARE TO FIRE
TANK, FRONT
ACQUIRE AND FIR
WHEN READY
CEASE TRACKING

6-8. Subsequent Fire Commands. *a.* If the tar was not destroyed, or if another target has peared, the squad leader issues the comma PREPARE TO FIRE, following the comma CEASE TRACKING in the initial fire comma

b. The elements of the subsequent fire comma are:

(1) PREPARE TO FIRE.
(2) TARGET DESIGNATION.
(3) ACQUIRE AND FIRE WHEN REAL
(4) CEASE TRACKING.

6-9. Cease Tracking. CEASE TRACKING is nounced when the squad leader desires to interr firing for any reason. It also indicates the complet of the fire mission. Firing may be renewed by a r initial fire command.

6-10. Termination of Alert. Termination of the al is announced as CEASE TRACKING, END MISSION. If oral commands are not practical, ar and-hand signals may be used.

Section IV. FIRE CONTROL

6-11. General. Fire control is the ability of a leader to open fire at the instant he desires, shift fire from one target to another, and to cease firing at will. A leader must accomplish these promptly if the fire is to be effective. Lack of good fire control results in loss of surprise, premature disclosure of firing position, and fire on unimportant targets. Fire control depends on thorough discipline, technical training, and initiative of squad members. Because of noise, semi-isolation of firing position, limited vision, and fleeting opportunity, fire control must be simple to accomplish the mission and to engage new and unexpected targets.

6-12. Chain of Command. The squad leader controls the fire of his Dragon weapon. He takes his orders concerning the general area of his position, the sector of fire, type targets to be engaged, and displaceme from his platoon leader or the leader of the u which his seapon is supporting.

6-13. Adjustment of Fire. There is no fire a justment with the Dragon. If the gunner misses t target, he should determine if it was his tracki error or a malfunction of the missile. The gunn always places the crosshairs of the optical sight the center of visible mass of the target.

6-14. Overhead Fire. The Dragon missile shou never be fired over the heads of friendly troops.

6-15. Night Firing Techniques. The primary meth of firing the Dragon during the hours of darkn without the night sight is with artificial illuminatio When using this method, the procedure for targ

gagement described in this circular remains the ne. For methods of employing artificial umination, see FM 20-60.

6. Technique of Fire with the Night Sight. chnique of fire with the night sight will be discussed in subsequent additions to this circular or upon declassification of data and characteristics of the Dragon Night Sight.

CHAPTER 7

MARKSMANSHIP TRAINING

Section I. INDIVIDUAL DUTIES

7-1. General. Preparatory marksmanship training teaches essential skills and develops fixed and correct procedures in marksmanship before range practice begins. Thorough instruction and carefully supervised practice in the preparatory phase saves time and ammunition during range firing and develops techniques and procedures necessary for well-trained Dragon teams.

7-2. Duties of Squad Members. *a.* The squad leader is in command of the team and is responsible for the equipment. He observes, adjusts, controls, and supervises the conduct of fire of the Dragon. He employs the squad according to orders of the platoon leader and is responsible for properly concealing weapon. He keeps the platoon leader informed of th status of ammunition supply and supervises am munition resupply.

b. The gunner is responsible for acquiring th target, determining if it is within range, tracking and firing upon designated targets. He is als responsible for maintenance of the weapon. Th gunner carries the tracker in the carrying case an one round.

c. The assistant prepares a second round for firin if the need arises. He insures the backblast area i clear before firing and assists the gunner in main tenance of the Dragon. He carries two rounds.

Section II. GUNNER AND ASSISTANT GUNNER TRAINING

7-3. Training Sequence. The steps of preparatory marksmanship are taught in the following sequence:

a. Positions.
b. Sighting and aiming.
c. Breathing.
d. Tracking.
e. Examination.

7-4. Positions. Position exercises teach positions used by the gunner and assistant gunner when firing from the sitting, kneeling, and standing positions at both stationary and moving targets. Aiming procedures can be included in position exercises.

a. General Characteristics of Positions. The following characteristics apply to all firing positions.

(1) In each position, the Dragon launcher will be over, and resting on, the gunner's right shoulder as close to the curve of the neck as possible.

(2) In each position, the left hand will grasp the left portion of the tracker and the right hand will be on the trigger assembly, with the thumb on the trigger safety plunger and the fingers on the trigger lever. To fire the weapon, depress the trigger safety plunger with the right thumb and squeeze and *hold* the trigger with the fingers of the right hand.

(3) In each position, there is some point at which the weapon aims naturally and without effort. If this point is not the center of the target, shift the body t bring the weapon into the correct alinement.

(4) In each position when tracking a movin target, the gunner, by leaning in the direction o target movement, should be uncomfortable when h initially acquires and begins to track the target. Thi will allow the gunner to be in a more comfortabl position during the final and most critical stages o missile flight, as the target moves across his front

(5) In each position, the gunner must appl constant downward and rearward pressure on th tracker in order to hold the launcher firmly on hi shoulder. The gunner must keep in mind that he i part of the weapon, and any unnecessary movemen will affect the missile's path. He must keep a firm posture and rigid contact between himself and th weapon during target engagement.

b. Sitting Position.

(1) *Gunner.* The gunner will sit with his leg extended to the front and feet touching the bipo legs. With the launcher over the right shoulder, ben forward at the waist until the right eye is presse against the eyeguard of the tracker (A, fig 4-1) Position the hands as described in *a* above. To adjus for elevation, in order to properly acquire the target depress the bipod friction lock and slide it down t

ıcrease the elevation, and up to decrease the ievation. This is done with the left hand. To make ıinor adjustments in elevation or cant, extend or ətract the left and right bipod locks.

(2) *Assistant gunner.* The assistant gunner will neel on his left knee or both knees facing the back-last area to insure it is clear.

c. Kneeling Position.

(1) *Gunner.* The gunner kneels on both knees nd sits back on his heels. He bends forward at the vaist until his right eye is pressed against the racker eyeguard (B, fig 4-1). The gunner's hands are ositioned as described in *a* above.

(2) *Assistant gunner.* The assistant gunner ıkes the same position as in *b*(2) above.

d. Standing position.

(1) *Gunner.* The standing position is used vhen the gunner is firing from an open fighting osition. The gunner will stand with his feet about houlder width apart and bend forward at the vaist until his eye is pressed against the tracker yeguard (C, fig 4-1). His hands are positioned as escribed in *a* above. He adjusts elevation as escribed in *b* (1) above. His knees are slightly ent.

(2) *Assistant gunner.* The assistant gunner vill stand on both feet, facing and observing the ackblast area.

7-5. **Sighting and Aiming.** *a.* The gunner visually elects a target and acquires it through the tracker ptical sight by adjusting the upper portion of his ody (A, fig 4-2). Once he determines the target is vithin range by using the stadia lines (B, fig 4-2 nd C, 4-2), he places the crosshairs of the optical ight on the center of visible mass of the target nd keeps the crosshairs on one selected point until the missile is fired and impact is observed (D, fig 4-2). The gunner must always keep the rosshairs of the optical sight on one selected oint of the target whether it be a moving or tationary target. When tracking a moving arget, the gunner moves the upper portion of his ody laterally to maintain the proper sight pic-ure.

b. The gunner does not adjust the aiming point or range or speed. He always places the rosshairs of the optical sight on the center of arget's visible mass.

c. The gunner must concentrate on his aiming oint. He must forget about the missile in flight or its relative position in the sight. If he allows himself to become distracted, his target tracking will become poor and his chances of hitting the target are reduced.

7-6. **Breathing.** To prevent breathing from interfering with his tracking, the gunner first takes a breath of air, lets part of it out, and then holds the remainder while he presses the trigger. He should not breathe while tracking a target since his body movement will cause the launcher to move. To check the gunner for proper breathing, observe his back. If it rises and falls as he tracks a target, he is breathing improperly.

7-7. **Tracking.** *a. General.* Training in tracking a moving target begins when proficiency is attained in positions, sighting and aiming, and breathing.

b. Instructional Tracking Exercises. Instructional tracking exercises should begin on a target acquisition/tracking range set up for use with the Dragon training equipment. In this phase of training, the gunner performs a series of tracking exercises to familiarize himself with procedures he must apply in gunner qualification. During this training, the gunner tracks the center of the target board of infrared transmitter and his progress is checked by using the monitoring set.

c. Qualification Tracking Exercises. Qualification tracking exercises should be conducted on a target acquistion/tracking range set up for use with the Dragon training equipment. Gunners will be qualified for their tracking ability through the monitoring set. The gunner will perform qualification exercises against stationary and moving targets (app B).

d. Tracking Exercises Without the Use of The Dragon Training Equipment. After qualification, the gunner can track any moving target on streets or highways, or use any expedient method which enables him to maintain his tracking proficiency. The gunner should conduct tracking exercises as often as possible using the Dragon training equipment to keep a close check on his tracking ability. All infantry battalions will be equipped with Dragon training equipment.

e. Target Tracking. The gunner has only one mission after missile launch, and that is to track with precision. The mission success and his own survival will be determined by how well he tracks his target. If the gunner tracks well, the rest of the system will perform as designed, and destroy the target.

Section III. TEAM DRILL

7-8. Organization and Equipment for Team Drill.

Crew member	*Individual weapon*	*Individual load*
Gunner	Pistol/Rifle	One round with tracker
Assistant	Pistol/Rifle	Two rounds

7-9. Team Drill. *a. Purpose.* The purpose of team drill is to train the soldier as a member of the team to place the weapon in and out of action with precision and speed.

b. Training. The attainment of precision is the first step in developing a proficient team and is acquired by strict adherence to the prescribed procedure. Only after the desired individual precision has been attained are the next phases—teamwork and speed—undertaken.

c. Teamwork. Teamwork is developed by rotation of duties during team drill so each member, by practice, becomes familiar with the duties of every other member.

d. Speed. Practice for speed is instituted as the last phase of instruction in team drill. Care must be taken in this phase to insure that precision and teamwork are not sacrificed for speed.

7-10. Forming for Team Drill. At the command FORM FOR TEAM DRILL, members of the team, except the squad leader, *fall in* at attention in a column with five paces between men and face the squad leader. To assign positions for team drill, the squad leader commands COUNT OFF. On that command, the team calls off from front to rear. The number one man is the gunner, and the number two man is the assistant.

7-11. Posting the Team. At the command POST, all team members move forward to a kneeling position directly behind their respective equipment.

7-12. Examine Equipment Before Drill. At the command EXAMINE EQUIPMENT BEFORE DRILL, team members examine equipment as follows:

a. Gunner.

(1) Checks the tracker carrying bag for damage and insures the cleaning kit is present.

(2) Removes the tracker from the bag and inspects the lenses, eyepiece, and trigger assembly for damage.

(3) Insures the trigger assembly is operational.

(4) Checks the launcher-bipod for proper functioning and inspects his round for damage.

(5) Replaces the tracker into the tracker carrying bag.

b. Assistant. Checks his two rounds for damage and insures proper functioning of the bipods.

7-13. Reports. When all equipment is checked, the following reports are given (incorrect items are reported when a deficiency exists):

a. The assistant reports AMMUNITION CORRECT.

b. The gunner reports ALL CORRECT.

7-14. Placing Weapon into Action. *a.* To place the weapon into action, the squad leader commands ACTION, and designates by pointing the direction the weapon is to fire and the general area of the weapon position. He places himself on a flank or in a position where he can observe and control the fire. At the command ACTION, the team moves rapidly to the position indicated. Where necessary, the squad leader may also indicate the type of position to be taken by the gunner (sitting, kneeling, or standing).

b. The gunner selects the exact spot, extends the bipod, and takes the firing position from which he can best accomplish his mission. The gunner then removes the tracker from its carrying bag, attaches it to the tracker support assembly, and removes the forward shock absorber. He sights through the tracker to acquire the target and determines if it is within range. The gunner fires as directed by the squad leader.

c. The assistant positions himself to the right of the gunner. He observes the backblast area and is prepared to secure another round and extend the bipod if the squad leader directs him to do so.

d. Team drill should be performed only with field handling trainers.

7-15. Taking the Weapon Out of Action. The squad leader commands OUT OF ACTION Upon this command, the gunner removes the launcher from his shoulder, removes the tracker and places it into the tracker carrying case. He replaces the forward shock absorber and collapses the bipod. The assistant secures his ammunition. The squad leader indicates the line of march by facing in that direction. The assistant positions himself behind the gunner, and moves on command from the squad leader.

Section IV. TRACKING RANGE AND TASK REQUIREMENTS

7-16. Target Acquisition Tracking Range Requirements. *a. Permanent Range.* Training with the Dragon training equipment does not require the use of a live fire range. Gunner

raining is accomplished without the use of live nissiles, and only the M64 grenade cartridges nstalled in the LET will be fired during in- tructional and qualification courses. All that is equired is a firing line to accommodate the LET nd two target vehicle roads running parallel to he firing line. See figure 7-1 for a diagram of a arget acquisition/tracking range.

(1) *Firing line.* The firing line should be long nough to allow a maximum number of LETs to e used during the tracking exercises. The back- last area should be roped off for safety (see fig 7- for organization of the firing line).

(2) *Target vehicle roads.* The target vehicle roads should be parallel to the firing line and should be at least 300 meters long. The longer road lengths allow a greater variation in tracking runs. The area between the firing line and the target vehicle roads should be clear of obstructions that would interfere with the infrared target source.

b. Temporary Range. For temporary training, any area that meets the minimum requirements for a permanent training range can be used. Abandoned air strips, parade fields, drop zones, open fields or valleys, range roads, etc., are good examples of temporary ranges that can be used.

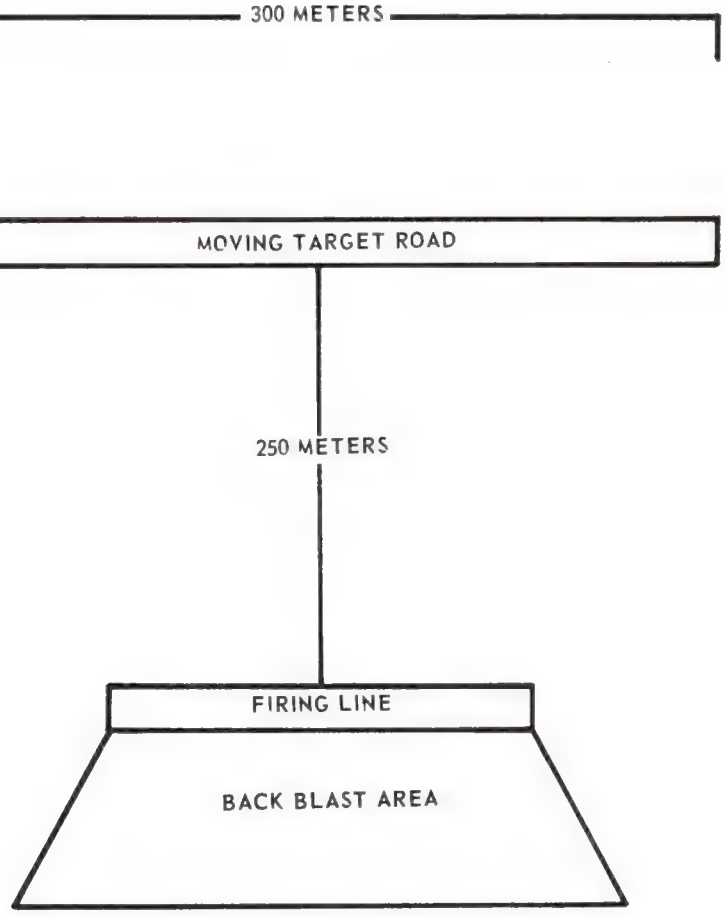


Figure 7-1. Target acquisition/tracking range.

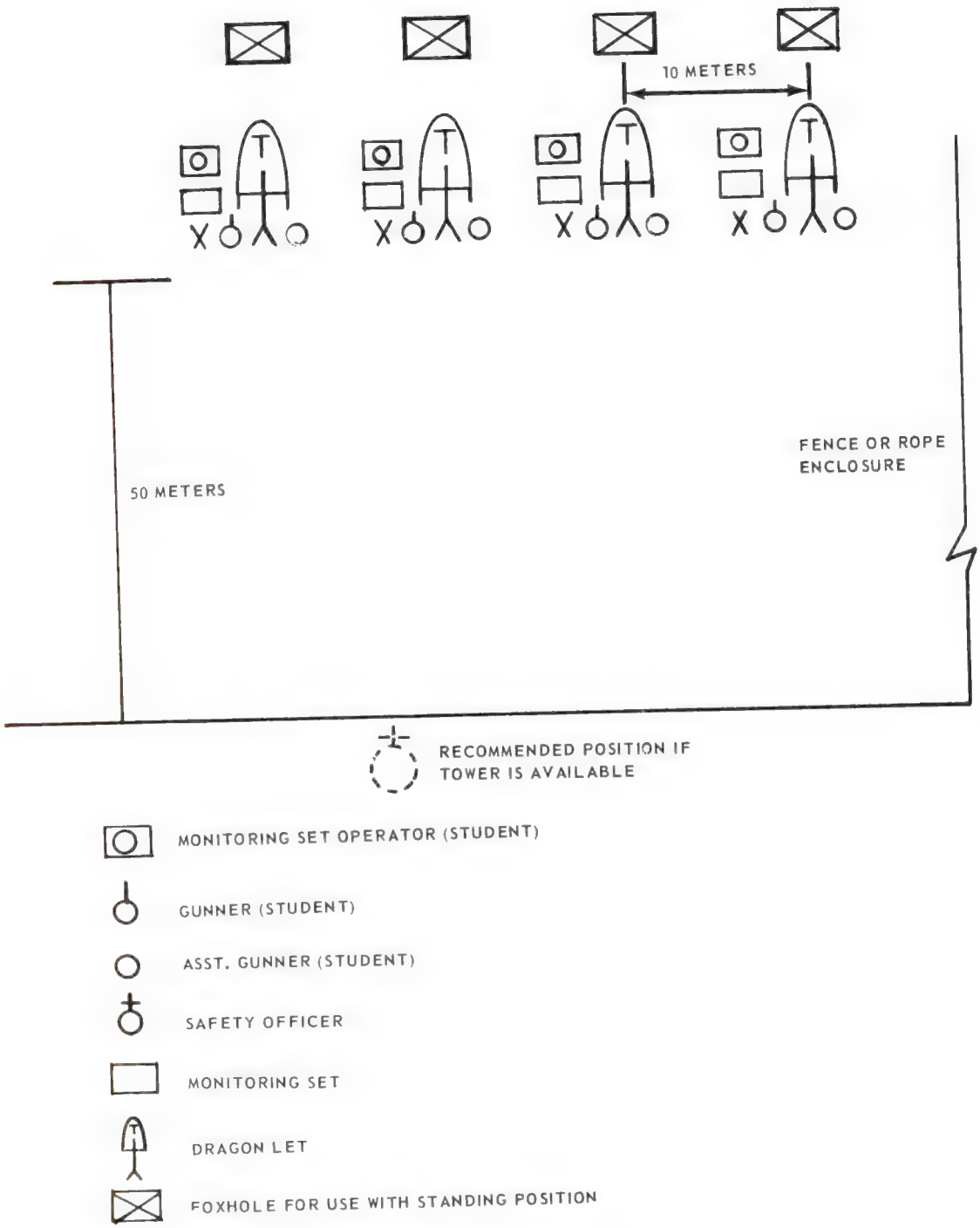


Figure 7-2. Firing line organization.

7-17. Tracking Rates. The gunner's tracking rate is determined by the range to the target vehicle and the target vehicle's speed. The monitoring set target range switch permits time selection to correspond with simulated missile flight time to the selecte target range. A target moving at normal speed nea the gun position will require a high tracking rate an short flight time. Targets moving at greater range

equire lower tracking rates and longer flight times.

Example: A 1000-meter target (10 second flight time) moving at 20 mph can be simulated by using a 5 mph target at 250 meters and a tracking time of 10 seconds.

Section V. RANGE PROCEDURES

-18. **General.** *a.* In all instructional firing, stress precision, steady tracking rate, point tracking, and firm firing position posture.

b. Exercises are fired in the order listed on the tables and are controlled by appropriate fire commands.

c. All Dragon LETs and trackers are inspected by a qualified instructor before and after each firing day to insure each item is clean, free from excess wear, and operational.

d. Troops must apply all safety precautions during all firing exercises.

-19. **Officer in Charge.** The officer in charge—

a. Organizes the range.

b. Assigns, coordinates, and supervises the firing lines.

c. Issues fire commands and general instructions to the firing line.

d. Enforces safety precautions prescribed in AR 385-63 and local SOP.

-20. **Coaches.** During instructional firing, a coach is at each LET to instruct and assist the gunner. The coaches:

a. Require crews to observe safety precautions.

b. Supervise the action at the LET and make sure that commands are properly executed. Repeat orders and instructions as necessary to insure correct understanding and timely execution.

c. Report the occurrence of any misfire, malfunction or discrepancy to the officer conducting the firing.

d. Critique the tracking runs.

7-21. **Assistant Gunner.** The primary duty of the assistant gunner is to load the LET. During qualification firing, he does not coach or assist the gunner in any way. The assistant gunner—

a. Resets the weight shift mechanism in the LET and loads the LET at the command of the officer in charge.

b. Reports UP when the LET is reset, loaded, armed, and the backblast area is clear.

c. Signals READY to the officer conducting the firing.

d. Repeats all fire commands.

Section VI. FIRING PROCEDURES

-22. **Instructional Firing.** *a.* Before firing, the officer in charge describes the range and gives instructions pertaining to firing procedures.

b. LETs are numbered from left to right.

c. The monitoring set will be placed to the left of the LET, and the M64 grenade cartridges will be placed to the right of the weapon.

d. The coach, gunner, and assistant gunner will take positions at the weapon. The gunner will check the operation of the Dragon tracker and launch effects trainer. The coach checks the operation of the monitoring set. The assistant gunner insures he has the correct number of grenade cartridges.

e. When all LETs are prepared for firing and the observance of safety regulations is checked, the officer in charge radios the target vehicle driver to start his run and gives the fire commands to the gunners.

f. At the completion of each tracking run, the officer in charge commands CEASE TRACKING.

g. At the termination of each tracking run, the coach will enter the appropriate information onto DA Form 4242R (Individual Score Card) from the monitoring set (fig 7-3). The assistant gunner rapidly unloads the LET and resets the weight shift mechanism, and waits for the command to reload. DA Form 4242R is authorized for local reproduction on 8 X 10½ inch card stock.

h. At the completion of an exercise the officer in charge commands CEASE FIRING. The assistant gunner rapidly unloads the LET, makes sure all men are standing clear of the weapon, and signals the officer-in-charge.

7-23. **Qualification Firing.** The procedure prescribed for instructional firing is used for qualification firing, except that—

a. Each man completes the prescribed firing courses specified before qualification firing.

DRAGON GUNNER SCORECARD

FIRING TABLE	GROUP NUMBER	DATE
GUNNER	SCORER	LET NO.
WEATHER: RAIN CLEAR FOG	WIND: SPEED	FROM: FRONT REAR RIGHT LEFT

RUN NO	HIT	MISS	QUANDRANT ERROR				METER SCORE		TARGET SPEED DIRECTION	RANGE		MONITOR	FIRING POSITION
			LT	RT	UP	DN	VERT	HORZ					
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
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19													
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21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

TOTALS	GUNNER'S SIGNATURE	CERTIFIED
_____ _____		

DA FORM 4242-R, 1 MAY 74

Figure 7-3. Gunner scorecard.

DRAGON GUNNER SCORECARD

IRING TABLE 6	GROUP NUMBER 1A	DATE 1 SEP	
UNNER SMITH 413-78-2616	SCORER JOHNSON	LET NO. 53	
EATHER: RAIN CLEAR FOG	WIND: SPEED 5-7	FROM: FRONT (REAR) (RIGHT) LEFT	

UN O	HIT	MISS	QUADRANT ERROR				METER SCORE		TARGET SPEED DIRECTION	RANGE		MONITOR	FIRING POSITION
			LT	RT	UP	DN	VERT	HORZ					
1	✓						95	95	STAT	250		10	KNL
2		✓	10,9,6	1	4,3 2	1	86	75	STAT			10	KNL
3									STAT			10	KNL
4									STAT			10	KNL
5									STAT			10	KNL
6									STAT			2	SIT
22									L-3-R			5	SIT
23									STAT			10	KNL
24									R-3-L			5	KNL
25									STAT			10	STD
26									L-3-R	250		5	STD
27													
28													
29													
30													

TOTALS _____ _____ _____ GUNNERS SIGNATURE _____ CERTIFIED

A FORM 4242-R, 1 MAY 74

Figure 7-3—Continued.

b. Unless the time allotted for firing is limited, do not conduct qualification firing on the same day with any portion of instructional firing to 60 rounds per day per man due to the fatigue factor involved in LET firing.

c. Before conducting any qualification exercise, the gunner is given a reasonable period of time to check the condition of the LET and M64 grenade cartridges.

d. In qualification firing, when a malfunction occurs, the gunner or assistant gunner holds up his hand and calls STOPPAGE. Thereafter, neither the gunner nor assistant gunner touches the LET until the scoring officer examines it.

e. If a malfunction occurs, through no fault of the gunner, he is permitted to refire the tracking run.

f. Decisions to disregard scores or to authorize reruns rest solely with the scoring officer.

g. If the malfunction is clearly the fault of the gunner, he is not permitted to refire the tracking run.

h. A total of 60 qualification runs are required (20 runs in each firing position). These runs will be accomplished in 5-run increments with a break or rotation between each increment. The gunner is rated as unqualified, 2d class gunner, 1st class gunner, or expert and enters the rating on the scorecard qualification line (para 7-25).

7-24. Dragon Program of Instruction. Appendix B includes the program of instruction for Dragon gunner training to include all instructional firing tables and qualification tables.

7-25. Scoring a Gunner. *a.* Each qualification run will be recorded by the scoring officer and each instructional run will be recorded by the coach on the individual scorecard (fig 7-3). The scorecard has columns for the monitoring set information entries which include—

(1) Hit or miss.

(2) Quadrant error (L-left, R-right, UP-up, IN down).

(3) Monitor set meter score (Vertical and Horizontal). Additional columns are available for the type target (stationary or moving), range, and gunner's firing position. This scorecard is used for either instructional firing or qualification firing.

b. A scoring table is used to determine each gunner's qualification rating. Ratings of expert, 1st class gunner, 2d class gunner, and unqualified are provided. Each rating consists of a score "band" to which the total hits on the scorecard are compared. The gunners are awarded *overall* qualification ratings based on the following criteria:

(1) Expert---------- 57 to 60 hits
(2) 1st Class Gunner---------- 51 to 56 hits
(3) 2d Class Gunner--------- 43 to 50 hits
(4) Unqualified---------- 42 and below

(5) Gunners must qualify with 14 hits or more in each qualification table.

CHAPTER 8

MARKSMANSHIP COURSES

1. General. *a.* The instructional courses rogressively train gunners to track moving and ationary targets and prepare them for the ualification course. The one familiarization table id seven instructional courses should follow in equence according to the table number. All miliarization, instructional, and qualification urses are conducted on a target acquisition/ acking range. The Dragon training equipment will e used in conjunction with the Dragon during all acking exercises. After completing tables I rough VIII the gunner is prepared to fire tables X rough XII for gunner qualification.

b. The instructional firing tables train the gunner the following skills:

(1) Rapid and accurate acquisition of targets.

(2) Proper tracking positions, traversing, ghting, breathing, and trigger operation.

(3) Firing and a rapid but smooth transient covery.

(4) Smooth and steady point tracking.

c. Typical observations which the instructor can scuss with the gunner during a critique after each acking run are:

(1) Nervous rection to the run.

(2) Improper tracking positions.

(3) Excessive reaction to simulated launch ast, e.g., pulling away from the eyepiece causing excessive launch transient.

(4) Firing before proper target acquisition.

(5) Improper breathing.

(6) Lack of concentration.

d. The administration of instructional and qualification firing tables should follow the procedures outlined in paragraphs 7-16 through 7-25.

e. Equipment.

(1) 1 Dragon tracker per 4 men.

(2) 1 monitoring set per Dragon tracker.

(3) 1 launch effects trainer per 4 men.

(4) 1 field handling trainer per 4 men.

(5) 2 target vehicles mounted with the infrared transmitter.

(6) 1 radio per target vehicle.

(7) 1 radio for officer in charge of firing.

f. Range. A live fire range that allows firing to maximum range of the Dragon is necessary. It must meet the safety requirements of AR 385-63. If possible, the range should allow engagement of moving targets and stationary targets. A mobile target sledge with a tank target painted on it can be constructed and pulled behind a tank. Do not pull the target sledge with an APC. Only practice (inert) missiles can be fired at moving targets. Targets should be constructed to standard NATO specifications.

CHAPTER 9

BASIC CONSIDERATIONS FOR TACTICAL EMPLOYMENT AND TRAINING WITH DRAGON

Section I. INTRODUCTION

9-1. General. To effectively employ the Dragon in the rifle platoon, the terms and techniques for applying fire must be understood.

9-2. Scope. This chapter provides the basic considerations for the employment of and training with the Dragon weapon system. This chapter includes—

a. Definitions and discussions of the terms frequently used in operations as they apply to the Dragon.

b. Basic considerations for employing the Dragon in offensive, defensive, and retrograde operations.

c. Basic considerations for conducting tactical training with the Dragon.

Section II. DEFINITIONS

9-3. General. This section defines and discusses terms concerning the Dragon which are frequently used in offensive, defensive, and retrograde operations. These terms must be commonly understood by all members of the rifle platoon prior to any discussion of tactical employment.

9-4. General Terms. *a. Designated Gunner.* The dragon tracker and missile are designed to be manned by one man. The squad leaders will designate members of their squads to carry the tracker and missiles. It is necessary that as many members of the squads as possible be cross trained on the Dragon system, and maintain a high degree of proficiency.

b. Dragon Teams. Due to the bulk of Dragon missiles, and the frequent necessity for Dragon gunners to be employed away from other squad positions, it will be necessary to form a Dragon team. Such a team would consist of a gunner with a tracker and one missile, and one or more additional riflemen, as deemed appropriate for the mission, to carry ammunition, observe for targets, and provide local security. In some instances, such as antiarmor ambushes, a squad leader may designate a fire team to be an antiarmor fire team. This would provide for sufficient personnel to carry ammunition, observe targets, and provides local security for the ambush. The team leader would control the fires of the element.

c. Mutual Support. That support which units render each other against an enemy because of their assigned taks, their position relative to each other and to the enemy, and their inherent capabilities.

d. Mutual Coverage. Two or more weapons are responsible for a sector/avenue of approach although they may not be able to see each other, under centralized control.

9-5. Attach Terms. *a. Fire and Maneuver.* Fire and maneuver consists of an element(s) establishing a base of fire to cover the movement of another element(s) while it maneuvers to close with and destroy or capture the enemy.

b. Assembly Area. The area in which a unit prepares for an offensive or defensive operation. Units are suitably dispersed, and while orders are issued, reconnaissances conducted, and resupply and maintenance accomplished, the command is disposed for defense, and the security required by the situation is maintained. Under these conditions Dragons will often occupy firing positions. In an attack situation, this area is usually company size and located within one hour's movement time to the line of departure.

c. Attack Position. This is the last concealed and covered position short of the line of departure where platoons deploy in the attack formation and make final coordination. The platoon will halt in the attack position only when final preparations cannot be completed in the assembly area or on the move, or when ordered to halt by the company commander.

d. Line of Departure. This is a line designated by the company commander to coordinate the beginning of the attack and is usually an easily recognizable terrain feature, such as a stream or road, running perpendicular to the direction of attack.

e. Final Coordination Line. This is a line used to oordinate the lifting and shifting of supporting fires nd the final deployment of the maneuver element in reparation for conducting an assault against an nemy position. It is located as close to the enemy osition on the objective as attacking troops can ove without becoming dangerously exposed to iendly supporting fires.

f. Release Points. A clearly defined point on the oute where subordinate units are turned over to the ontrol of their respective leaders.

g. Probable Line of Deployment. A line previously elected on the ground where attacking units deploy rior to beginning an assault during periods of mited visibility. It is located as close to the ob- ctive as possible without revealing the presence of ie assaulting element.

-6. Defense Terms. *a. Primary Position.* That ocation on the ground which provides the best bservation and fields of fire to accomplish the iission.

b. Alternate Position. The next best position(s) om which the assigned mission (the same iission(s) assigned for the primary position) can be ccomplished.

c. Supplementary Position. A position assigned r defending in a direction that cannot be covered om the primary position.

d. Forward Edge of the Battle Area [*FEBA*]. The FEBA is the line formed by the forward defensive positions.

e. Frontage. Space from side to side covered by a unit in combat.

f. Combat Outpost (*COP*). The COP is a line formed by the security echelon of a unit which denies the enemy close ground observation of the unit position (FEBA).

g. Outguard. One of the elements of the unit deployed on the COP. An outguard may vary in size from half a squad to a reinforced squad. Outguards are positioned on or near the topographic crest of terrain features in order to obtain maximum observation and long range fires. To insure that the combat outpost can provide early warning of the advance of the enemy, outguards are located where they can obtain overlapping sectors of observation. Adjacent outguards should be capable of mutual coverage and should be located within visual distance of one another (mutual support).

h. Long Range Fires. Fires employed against the enemy as soon as he comes within effective range.

i. Close Defensive Fires. Fires employed against the enemy that subject him to an increasingly heavier volume of fire as he approaches the FEBA.

j. Final Protective Fires. Fires immediately in front of the battle area which are used to break up the enemy assault. During final protective fires, automatic weapons fire their final protective lines.

Section III. BASIC CONSIDERATIONS OF EMPLOYMENT

-7. Firing Positions. *a.* When choosing a firing osition for the Dragon, certain basic con- iderations must be observed, in order to naximize its effectiveness. These considerations pply to the selection of primary, alternate, and upplementary positions in offensive, defensive, nd retrograde operations.

b. Firing positions must cover the armor avenue(s) f approach in the unit's sector.

c. The desirable characteristics of a Dragon firing osition are:

(1) Gunner observation of assigned sector to naximum range of weapon (if possible).
(2) Good fields of fire.
(3) Cover and concealment.
(4) Mask clearance.
(5) Security.
(6) Concealed routes.
(7) Capability for flanking fire.
(8) Backblast area.

-8. Fields of Fire. When determining fields of fire, nge and line of sight to the front and flanks must e considered. Every effort must be made to capitalize on the strength of the Dragon, which is its high probability of first round hit out to 1000 meters. An ideal field of fire would be open terrain in all directions permitting target acquisition and engagement out to maximum range of the weapon. Since the gunner must keep the target in the sights of the weapon until missile impact, undulating terrain could permit the target to become masked during tracking, causing the gunner to lose sight of and miss the target. Wooded terrain can also have an adverse effect on target. Wooded terrain can also have an adverse effect on target observation and tracking.

9-9. Cover and Concealment. The major vulnerability of the Dragon that the gunner is exposed to enemy direct and indirect fires while tracking the missile throughout its entire flight. A position which is known to the enemy is easily destroyed. Therefore, selection of firing positions which provide as much concealment and cover as possible is next in importance to observation. Cover is protection from enemy fire. Items used for cover include walls, trees, logs, sandbags, etc. Con-

cealment is denial of observation by the enemy, both ground and air. Of primary importance with the Dragon is the backblast, or launch signature effect of the missile when launched. Every effort must be made to prevent the enemy from detecting this launch signature. This can be accomplished by such measures as clearing away all loose sticks and rocks behind the launcher, wetting down the backblast area, applying pentaprime to the ground, covering the ground with shelter halves, etc. Excess movement in the position must be avoided to prevent detection. Indirect fire weapons, firing both HE and smoke, can be used to distract the enemy; however, the target must not be obscured during missile flight. Overhead cover is difficult to provide, due to backblast, but overhead concealment is vitally important, to prevent detection by air.

9-10. Routes. The Dragon gunner may have to displace frequently, from firing position to firing position in the attack and retrograde, and from primary to alternate and supplementary positions in the defense. Routes into, out of, and between positions must provide good cover and concealment, and facilitate speed of movement.

9-11. Mutual Support. Firing positions should provide for mutual support with other Dragons and TOW. Fields of fire should overlap and be carefully integrated.

9-12. Security. Provisions should be made to provide security for Dragon gunners to the front, flanks, and rear. Such security could include protective mines, outposts, STANO devices, and individual fighting positions. It may also be provided through the use of Dragon teams.

9-13. Target Engagement. Target priorities and rules of engagement may change from situation to situation, and commanders must specify to Dragon gunners, either in their plans and orders, or in unit SOP, target priorities and rules for engaging multiple targets. Dragon gunners should be assigned definite sectors of fire to preclude more than one weapon engaging the same target simultaneously. When engaging targets, gunners should insure that they will be able to track the target until impact; otherwise, missiles will be wasted. As a rule, Dragon should be fired to engage targets at maximum range—an exception to this rule may be during initial engagement, when fires are held until the bulk of the weapons can engage a number of targets simultaneously to gain surprise.

9-14. Oblique Fire. Whenever possible, gunners should attempt to engage targets with oblique fire. Platoon and squad leaders, when selecting positions, must make every effort to emplace the gunner in a position that permits him to cover his sector with oblique fire. It is much more difficult for the enemy to retrace the flight path of a missile to its launch site when the missile moves obliquely across their front, as opposed to being launched from a head-on position. When firing to the oblique, the gunner can be protected from small arms fire to his front by a berm, that would also make enemy detection of the launch signature from the front of the gunner's position, more difficult. Forces in the assault generally are more attentive to fires from their immediate front, and are therefore more vulnerable to fires from their flanks.

9-15. Dragon Methods of Employment. The Dragon is a platoon weapon. Its employment is governed by the platoon leader's assessment of the tactical situation. As a designated weapon, with no dedicated crew, the weapon need only be carried into combat when the threat substantiates its use. Based on the situation, the platoon leader may employ all three Dragons, or none at all. He has two options open to him for their employment. These are:

a. Centralized Control. The platoon leader controls the fires of his Dragon gunners, either by physically locating the weapons in his vicinity, and personally directing their fires, or by grouping them together under the control of the platoon sergeant or other individual the platoon leader designates.

b. Decentralized Control. Dragon gunners operate with, and are controlled by their squad leaders. It may be necessary for the squad leader to employ one fire team as a Dragon team. The platoon leader normally gives the command for opening fires.

Section IV. EMPLOYMENT OF DRAGON IN THE ATTACK

9-16. Missions. This section provides guidance for the platoon leader, squad leader, and Dragon gunners in employing the Dragon in the attack. The provisions are applicable to the rifle platoons of all types infantry battalions.

a. The mission of the rifle platoon in the attack is to close with and destroy or capture the enemy. The rifle platoon normally attacks as part or a coordinated company action as described in FM 7-10. It maneuvers under cover of both organic and nonorganic fire support to assault the enemy. The platoon may also be employed as a semi-independent force in which the platoon leader has more freedom of action.

b. In an attack, the primary mission of the Dragon ınner(s) is to assist the advance of the platoon with ıpporting antiarmor fire. In the absence of armor rgets, Dragon(s) may be employed to eliminate rtifications, crew-served weapons positions, to clude antitank guided missile (ATGM) crews, ıd other suitable hard targets. To accomplish ıese missions, the platoon leader should employ ragon gunners in a manner in which he can best ntrol their fires: either centralized and con-olled by himself, or through the platoon ergeant or assistant platoon sergeant; or ecentralized under squad leader control, or a ombination of both.

-17. Conduct of the Attack. *a.* The following onsiderations govern the employment of the ragon(s) in the rifle platoon in the attack.

(1) The nature of the threat on or near the ob-ctive and along the route of attack; i.e., known or uspected locations of suitable targets, and enemy rmor approaches in to the route of advance.

(2) Observation and fields of fire from the LD ver the route(s) to the platoon objective.

(3) The availability of firing positions which rovide good observation and fields of fire along the oute(s) and the objective.

(4) The availability of antiarmor fire support rom other sources.

b. If the LD is in the proximity of the initial ob-ctive and good firing positions are available, some Dragons may occupy positions on or in the vicinity of the LD. However, normally at least one Dragon per platoon should accompany the maneuver element in order to provide continuous antiarmor protection against counterattack while consolidating the objective. Where the LD is too far from the objective or when suitable firing positions do not exist, the Dragon gunners should accompany the maneuvering element across the LD. Selected firing positions are occupied forward of the LD from which effective antiarmor supporting fire can be delivered. In mechanized units, Dragons can provide covering fire from the dismount point. When centrally controlled, Dragons will normally displace by bounds to assure continuous overwatch of the advance (fig 9-1).

c. During the assault, Dragons should be in position to best assist the advance of the rifle squads. They should be employed as far forward as possible, consistent with their ability to provide accurate fire during the assault. Some Dragons may be employed in an overwatch role; however, one or more should accompany the assaulting element to provide continuous long-range fire beyond the objective. Dragons employed in an overwatch role will be employed with a team to provide communication and security. The platoon leader should position gunners in the assault element where he can best control them and direct their fires. Provisions must be made to mark targets and control the fires for Dragon(s) in overwatch positions. This may be done by radio, pyrotechnic signal or sector of fire.

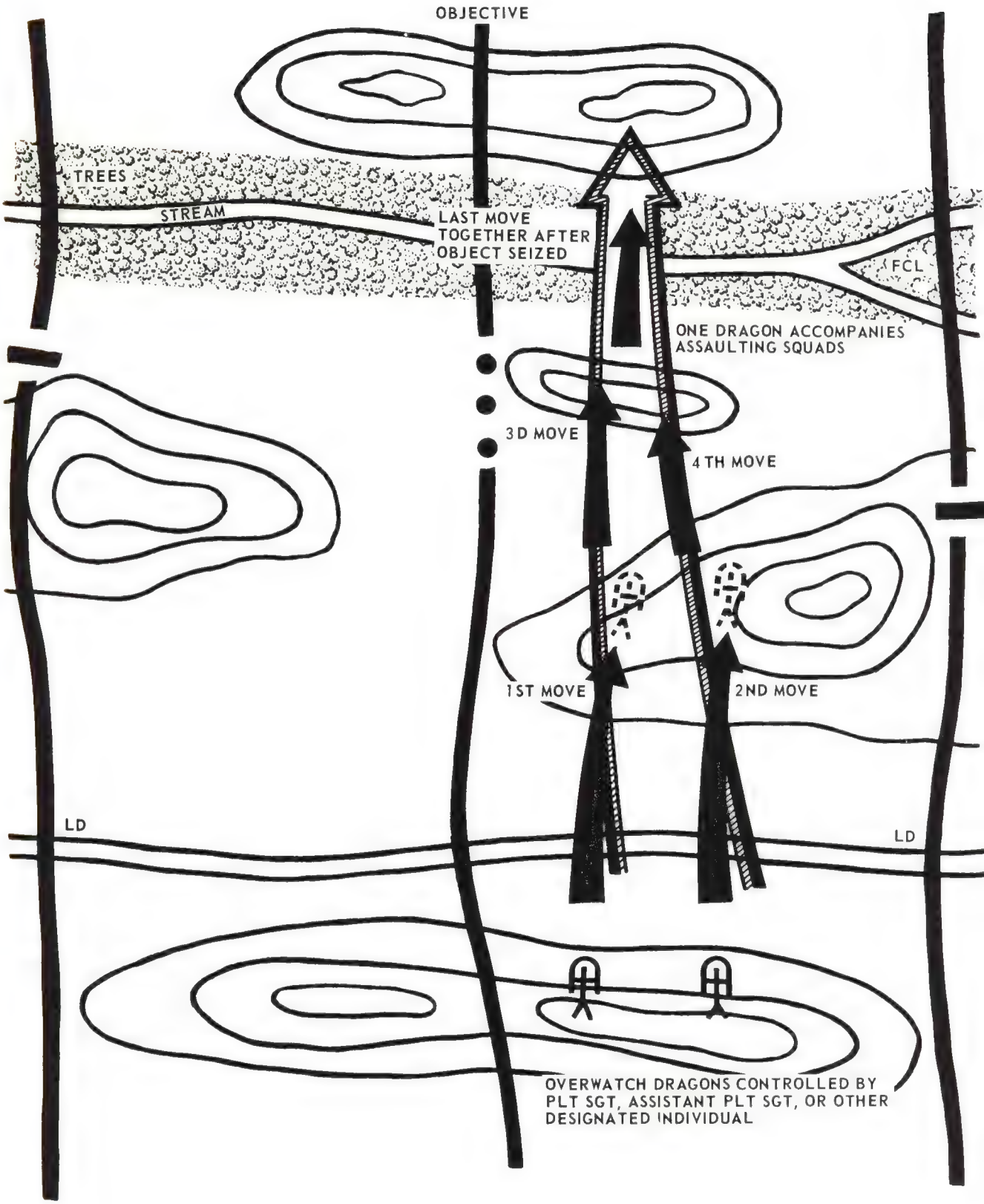


Figure 9-1. Overwatch Dragons in the attack.

-18. **Consolidation and Reorganization.** *a.* Im-ıediately after seizing the objective, the Dragon unner(s) should be displaced to positions which fford long-range fires beyond the objective to rovide for antiarmor defense in depth and cover the ıost likely avenues of armor approach into the osition. The use of guides to direct those gunners isplacing from overwatch positions into new ositions will expedite this operation.

b. Reorganization is a continuing process; owever, it is given special emphasis upon seizure of he objective. Dragon gunners are assigned positions nd defensive sectors, and begin preparing for all-ound antiarmor defense.

-19. **Conduct of the Night Attack.** *a.* The advent of ong-range, highly effective night sights for the Dragon permit it to be used during periods of educed visibility in the same manner as during aylight. Under artifical illumination the echniques of daylight operations also apply. This aragraph deals primarily with a nonilluminated, onsupported night attack by stealth.

b. Night combat is generally characterized by—

(1) A decrease in the ability to place aimed fire n the enemy.

(2) An increase in the importance of close ombat, volume of fire, and the fires of certain eapons laid on targets during daylight.

(3) Difficulty of movement.

(4) Difficulty in maintaining control, direction, nd contact. Despite these difficulties, the night ttack gives the attacker a psychological advantage y magnifying the defender's doubts, fears, and pprehension of the unknown.

c. The conduct of the attack by stealth requires hat the attacking elements reach the probable line f deployment without being discovered. If the ttack is discovered prior to this, the unit com-ıander may call for illumination and planned supporting fires. If he does call for illumination, the attack then continues using the tactics and techniques for a daylight attack.

d. The attacking units move from the assembly area in a column formation. The Dragon gunners are located in the platoon formation where they can best deploy into the assault formation or separate themselves from the assaulting element if their mission is to support by fire.

e. Whenever possible, firing positions forward of the LD for support weapons should be selected during daylight hours. Characteristics and limitations of the night sight in regards to range must be carefully considered when selecting these positions. Signature effects of the missile must also be carefully considered; the Dragon missile leaves a distinctive launch signature and flight path at night due to the action of the side thrusters. Because of this, rapid displacement to preselected alternate firing positions is necessary to prevent accurate counterfire from the enemy.

f. If it is not possible to preselect firing positions during daylight, Dragon gunners should accompany the maneuver element, unless the nature of terrain, such as desert, etc., provides a high assurance of a clear flight path for the missile.

g. Dragons employed in the assault echelon are employed in the same manner as during daylight hours; however, the command to fire is given by the platoon leader and not normally delegated to subordinates. If the attack has been discovered, gunners provide accurate fire support, on the platoon leader's command. When possible, maximum use should be made of LAW's to engage close-in targets, to prevent unnecessary identification of Dragon positions because of launch signature cues.

h. When the objective has been seized, the plans for reorganization and consolidation are carried out as described in paragraph 9-18.

Section V. EMPLOYMENT OF DRAGON IN THE DEFENSE

-20. **General.** *a.* This section provides guidance for he platoon leader, the squad leader, and the Dragon unner in employing Dragon in defensive perations. The provisions are applicable to the rifle latoons of all types infantry battalions.

b. The mission of the platoon in the defense is to epel the enemy's assault by fire and close combat. The Dragon has combat characteristics which are of najor importance in the defense. Dragon(s) can—

(1) Destroy any known armored vehicle.

(2) Deliver accurate fire with a high first round it probability out to 1000 meters, day or night.

(3) Deliver overhead fire.

9-21. Methods of Employment in the Defense. Control of Dragon fires may be centralized, decentralized, or by a combination of both of these methods.

a. Centralized Control. The fires of the Dragon gunner are controlled by the platoon leader, or through him, by the platoon sergeant or assistant platoon sergeant (when authorized by TOE). This is accomplished by centrally locating the Dragon gunners under the control of the individual directing their fires.

b. Decentralized Control. The fires of the Dragon gunners are controlled by the squad leaders in the same manner that he controls other weapons of his squad.

c. Firing Positions. Dragon is employed by the platoon leader to provide antiarmor protection for the platoon area, and as part of the coordinated company antiarmor defense plan. The platoon leader will select the general firing position and a sector of fire for each of his Dragons. These firing positions should cover the most likely armor avenue of approach into the platoon area, and should afford antiarmor defense in depth for the platoon. The platoon leader will select alternate and supplementary positions. Firing positions should be selected to take maximum advantage of the range of the weapon, and it should provide for covered and concealed routes between positions.

9-22. Employment in the Security Area. *a. Mission of the Combat Outpost (COP).* The mission of the combat output is to provide early warning of the enemy advance and to deny him close ground observation of the battle area. Within its capabilities, the COP delays, deceives, and disorganizes the enemy without becoming decisively engaged.

b. Employment With COP Force.

(1) Dragon gunners on the COP are assigned positions, normally with outguards, from which they can cover the most likely armor avenue of approach to the COP, and take full advantage of their long-range fires. They should possess a degree of mobility at least equal to the enemy's.

(2) Dragons will normally be employed on the COP in conjunction with TOW's and tanks. Once it becomes necessary to withdraw the COP, the Dragons will provide antiarmor covering fire for the infantry. Dragons can also be employed from the FEBA to provide covering fire for the COP forces during their withdrawal (fig 9-2).

(3) Dragon can be employed between the COP and the FEBA as elements of armor killer teams, to further slow and confuse the enemy advance. For a detailed discussion of the employment of armor killer teams refer to FM 23-3.

9-23. Employment on the FEBA. *a. Fire Coordination.* Employment of the Dragon on the FEBA is characterized by centralized planning and decentralized execution. The platoon leader will determine the most dangerous armor approaches into his sector. Based on this analysis, he will assign firing positions to each Dragon gunner. These may or may not be located in each squad area. The platoon leader must insure that the fires of his weapons are integrated with each other, and coordinated with the antiarmor fires of company antiarmor weapons and/or adjacent units.

b. Fields of fire. The key factors in position selection are armor avenues of approach and fields of fire. Positions should be selected that provide gunners with fields of fire out to the maximum range of the weapon whenever practicable.

c. Position Location. Because of the signature effects of the weapon, the requirement for gunners to displace frequently, and the need for good covered and concealed routes between positions, it is preferable that firing positions not be selected in the midst of other squad positions. However, the determining factor is the location of the best primary position that will accomplish the mission, whether it be in front, behind, among, or to the flanks of the other squad positions. When Dragons are employed well forward or to the rear of squad positions, it will normally be necessary to employ a Dragon team rather than single gunners.

d. Selection of Position.

(1) The rifle platoon leader designates general firing positions based on his assessment of the terrain. If control is decentralized, the rifle squad leader may select the exact firing position; or, if control is centralized, the platoon leader may have the platoon sergeant or assistant platoon sergeant (when authorized) select the exact position. The characteristics of a good position are discussed in paragraphs 9-7 through 9-15.

(2) In addition to selecting primary positions several alternate and supplementary positions should be selected so as to provide all-round antiarmor defense and defense in depth. In addition the signature effects such as dust from backblast, flash, and noise, dictate that the Dragon gunners may have to displace frequently. The same care and attention should be given to the selection of alternate and supplementary positions as is given to the selection of primary positions to prevent the creation of gaps in the antiarmor defense plan. Good concealed and covered routes between positions are essential to insure rapid displacement and to prevent detection of movement. In selecting positions, isolated terrain features which may be used by the enemy to register fires should be avoided (A and B, fig 9-3).

e. Preparation of Position. Once the exact position has been located, the following tasks must be performed concurrently where feasible.

(1) Provide local security. This is done by the rifle squad as designated by the platoon leader. Additional security is provided by camouflaging personnel and equipment.

(2) Prepare Dragon for firing. Orient the Dragon on its sector of fire. Insure that the gunner will be able to see a moving target long enough to effectively engage it. After the weapon is properly

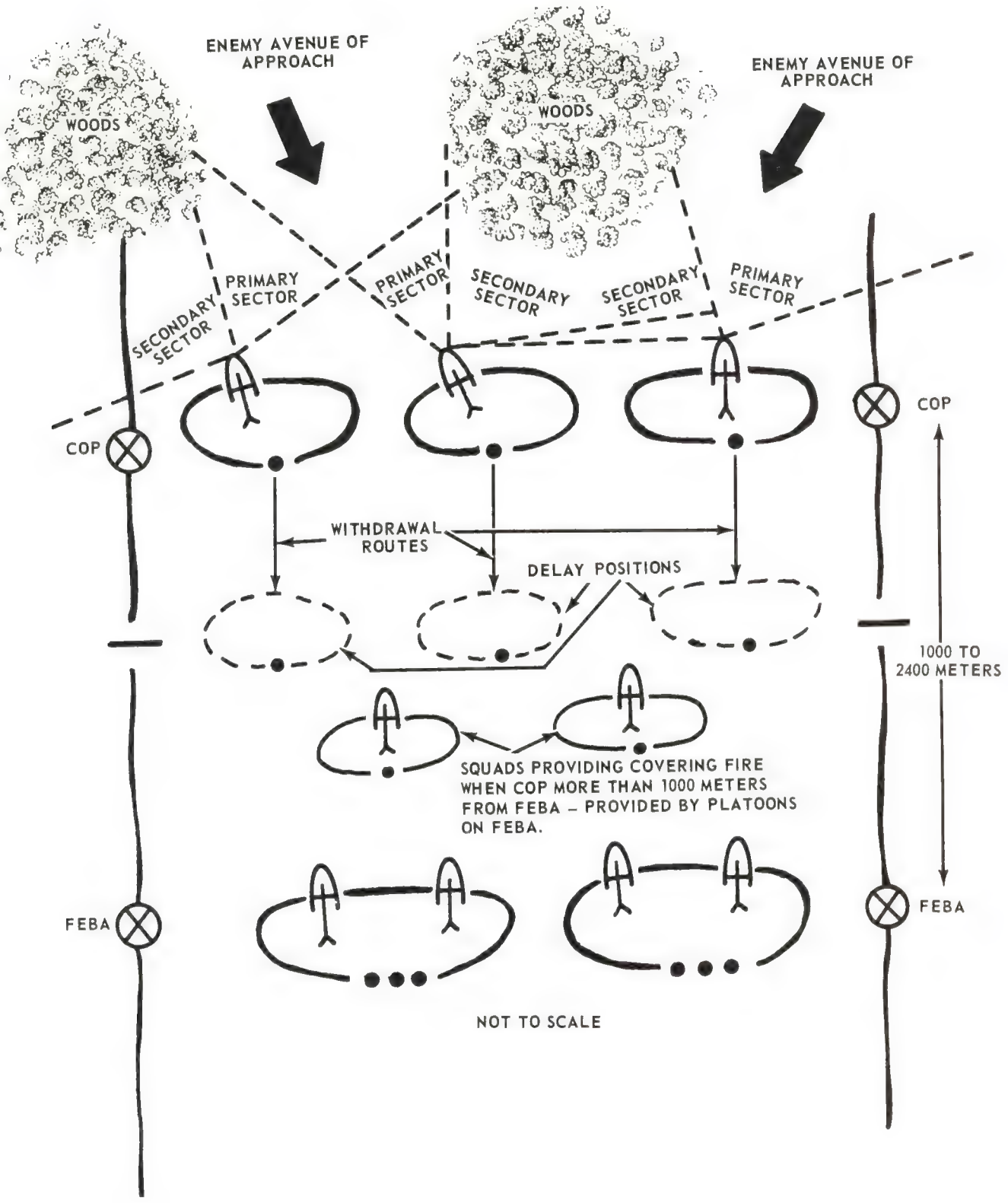


Figure 9-2. Employment on COP.

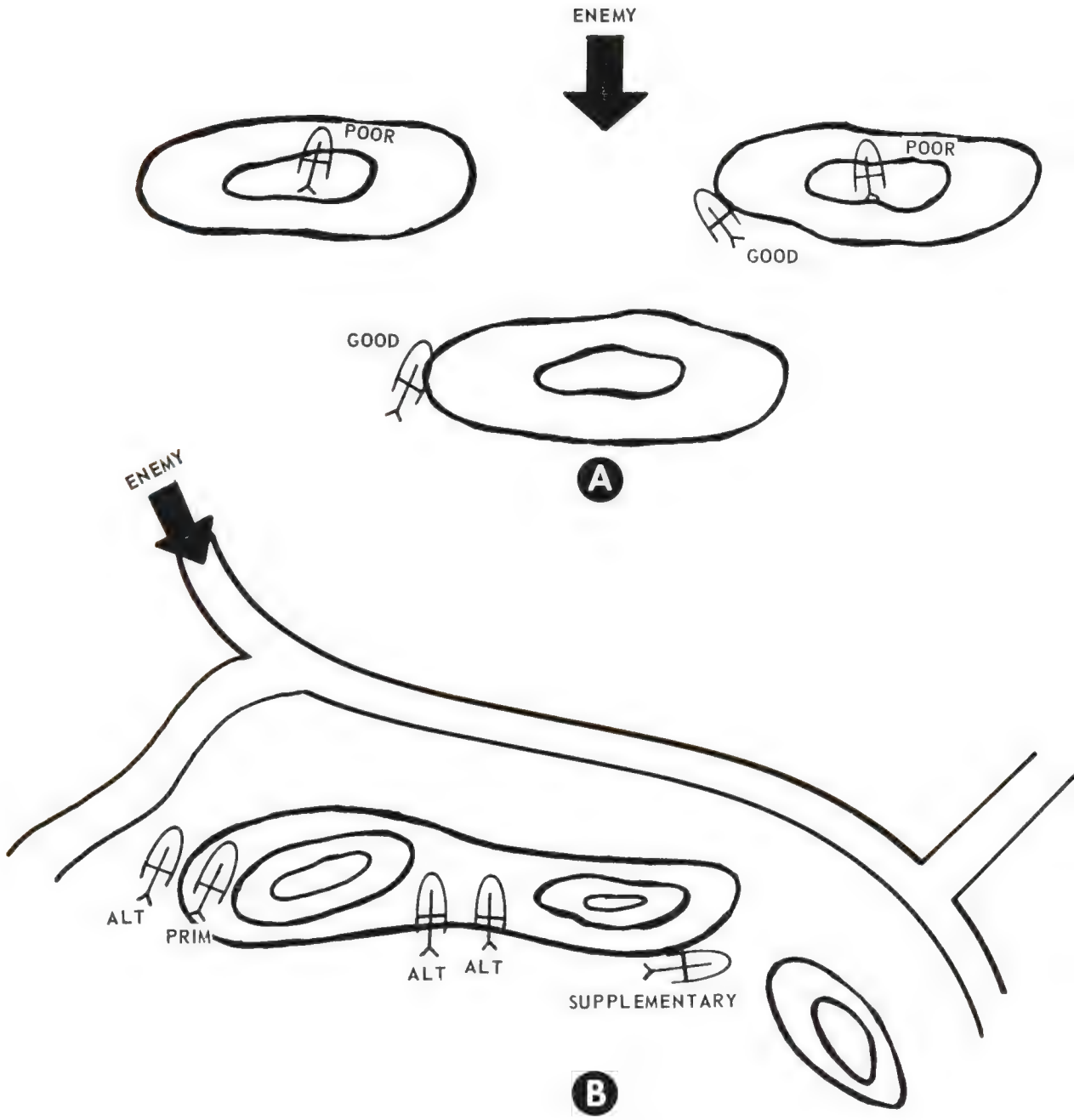


Figure 9-3. Primary, alternate, and supplementary positions.

sighted, the Dragon should be placed in its firing mode and rounds prepared for firing. Prepared rounds should be positioned near the tracker to facilitate rapid engagement of targets. Rounds should also be prepositioned at alternate and sup plementary positions, is possible.

(3) Clear fields of fire and backblast area Depending on the position selected, the Dragon

gunner may be required to clear foliage and other objects from the fields of fire and backblast areas to insure the most effective employment of the weapon. The weapon's signature must be kept to a minimum. Defilade positions will help conceal backblast.

(4) Coordinate with adjacent positions and antiarmor weapons.

(5) Prepare range cards. Range cards are essential for the rapid engagement of targets during all conditions of visibility and for quick resumption of a mission in case the gunner becomes a casualty. As soon as the weapon has been prepared for firing, the gunner normally prepares range cards in two copies. One copy stays at the position, and the other goes to the platoon leader. The gunner should also prepare range cards for alternate and supplementary positions. Essential items on a range card are:

(a) The weapons position with a magnetic azimuth and distance from a readily identifiable terrain feature (target reference point(s)).

(b) Unit's designation.

(c) Time and date of preparation.

(d) Sector of fire with azimuths to known features.

(e) Deadspace (ground weapon cannct cover).

(f) Minimum and maximum ranges if applicable (fig 9-4).

(6) Prepare concealment and cover for the gunner. Dragon gunners initially construct hasty positions, improving these positions throughout the time they are occupied. Because of the priority of the Dragon weapon, other squad members must assist in the preparation of firing positions.

(7) Select alternate and supplementary positions.

(8) Improve primary position.

(9) Prepare alternate and supplementary positions.

f. Fire planning.

(1) The commander's knowledge of the terrain and a thorough preparation of a fire plan are among the key advantages which offset the initiative of the attacker. Commanders and leaders must insure that their fire support is carefully integrated with the fire support of subordinate units. To insure the highest possible degree of coordination of fires, company commanders may adjust or change the fire plan of their platoons.

(2) Fire coordination in the antiarmor defense is of paramount importance because a unit's antiarmor fires are the keystone of the defense in an armor threat environment. The fire plan must be simple enough to be understood by every gunner, yet comprehensive enough to insure the best use of all available means of antiarmor fires, and must provide for positive control through the chain of command.

(3) The platoon fire plan is prepared by the platoon leader based on his sector as defined by the company commander and the antiarmor weapons employed in his sector. In assigning sectors the company commander may designate targets within each sector that he considers important company target reference points. These are used to aid the company commander and platoon leaders in controlling and shifting fires. They will normally be referenced by a lettering or numbering system. In evaluating his own sector, the platoon leader analyzes the armor avenues of approach he is faced with and positions his Dragons to cover them. In his analysis he will normally pick out additional reference points of importance within his sector. The Dragon gunners complete their range cards, including on them those company and platoon reference points they can hit from their position. The platoon leader incorporates these range cards into his fire plan, giving himself a complete sketch of the target reference points within his sector, and those weapons capable of engaging each. A sample platoon fire plan is shown in figure 9-5. The circled numbers indicate platoon reference points, the letters are those company targets the platoons can engage. The completed plan also include mortar final protective fires and target numbers, and the location of two tanks positioned within the platoon sector.

g. Fire Discipline.

(1) The timing of target engagement by Dragon is critical to the effectiveness of fires placed on the targets and to the success or failure of the defense. Fire discipline is directly related to the state of training and mental conditioning of Dragon gunners. Dragon positions should not be jeopardized by premature target engagement in which either the range is excessive or the target is not in position to insure a high probability of a first round kill. Fire discipline insures that Dragon weapons engage targets at optimum times and that only the best sighted weapon in relation to the target opens fire (A and B, fig 9-6). Random firing at antiarmor targets, especially tanks, decreases the effectiveness of the unit's overall antiarmor defense. If minefields are being used, antiarmor fires should normally be withheld until the tanks are in the close vicinity of the mined areas. However, if the mission, terrain, and enemy situation dictate, Dragons will be most effective if fired as soon as the tanks come into range, causing the enemy to deploy into the minefields at multiple points.

(2) There are advantages and disadvantages inherent in each of the above cases; decisions to engage should be governed by the situation. Each Dragon gunner must know which tank within a group of tanks he is to fire at when more than one

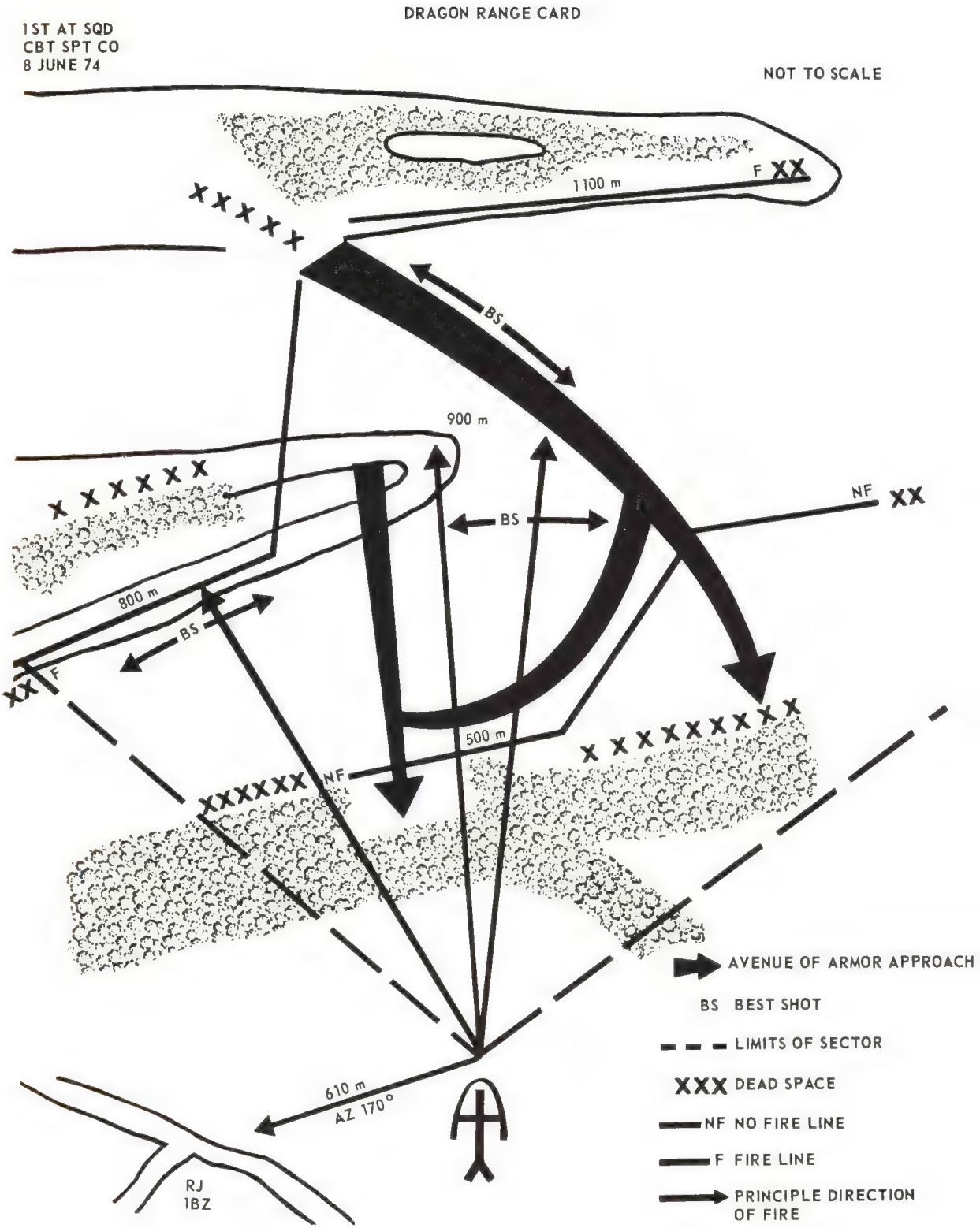


Figure 9-4. Dragon range card.

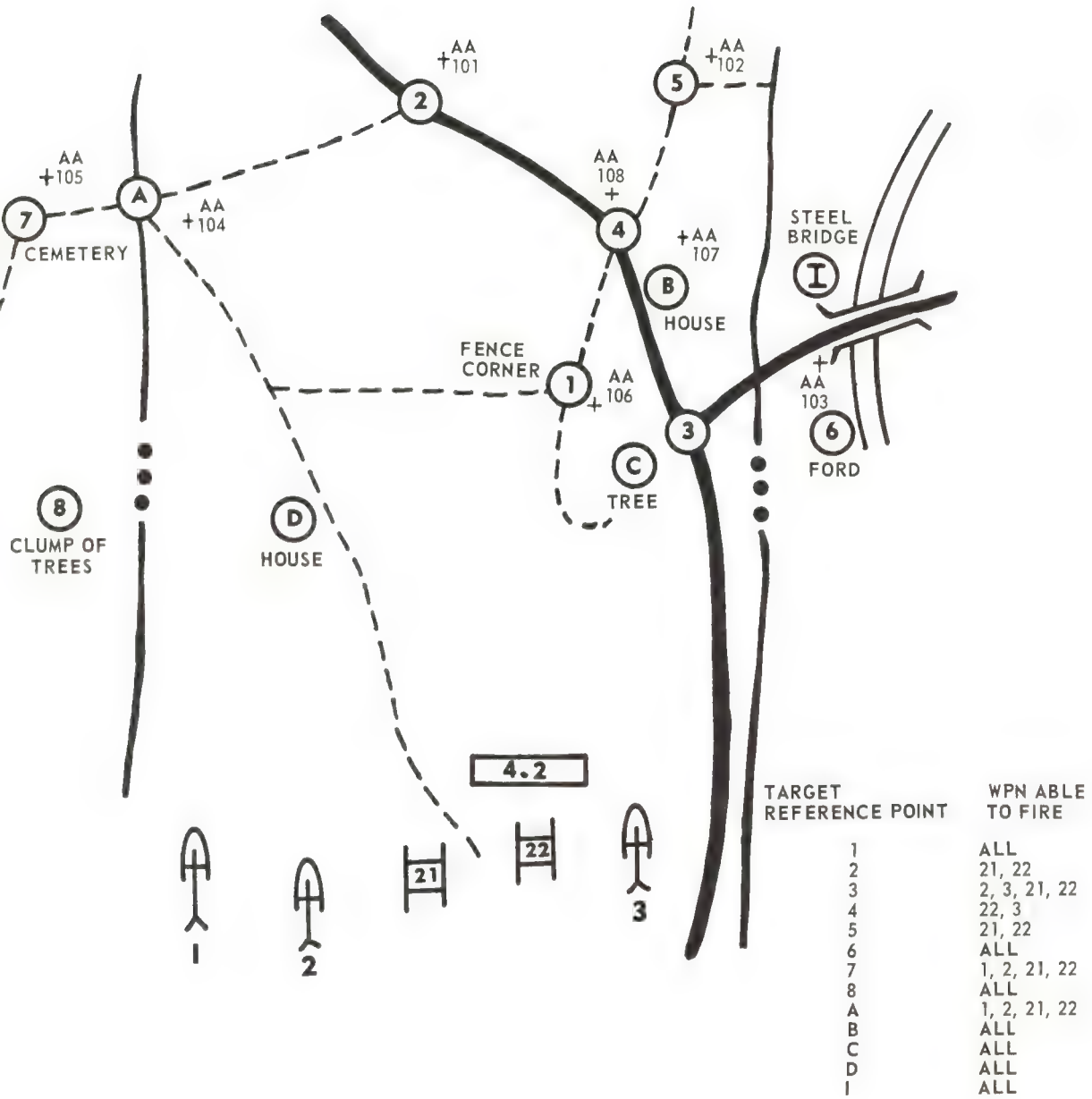
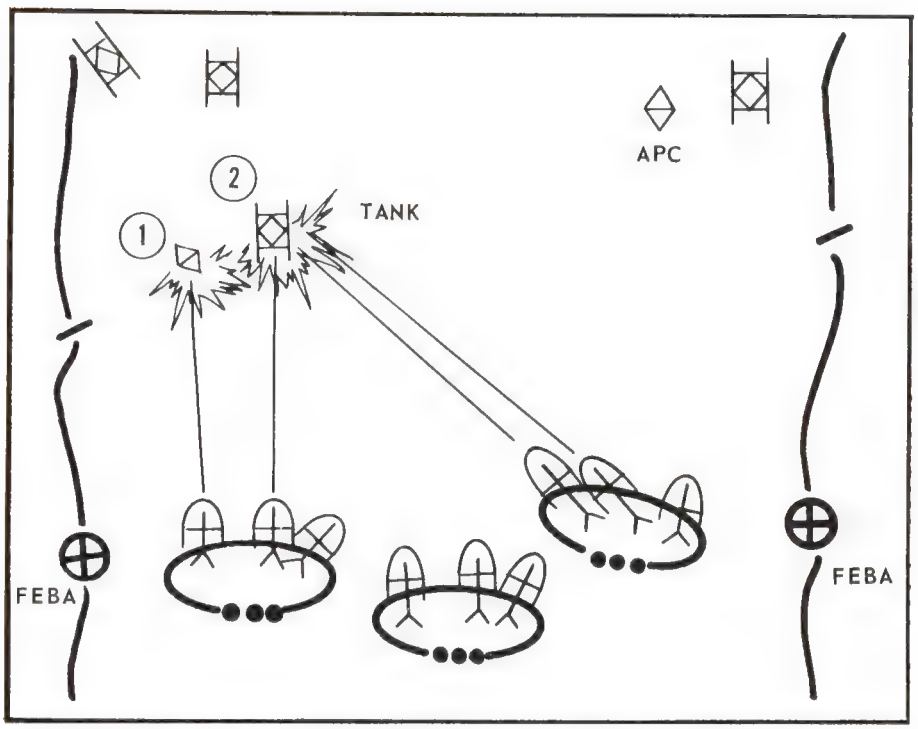


Figure 9-5. Sketch, completed platoon fire plan.

ragon is engaging multiple targets. If the enemy nks are in column, the lead and trail tanks should e engaged first. This is especially true if the enemy nks are in a defile or at other choke points. This ay slow the enemy's movement out of the target ea and allow time for more tanks to be engaged. or maximum effect, all Dragons covering an avenue f approach should engage targets simultaneously.

h. Obstacles.

(1) Obstacles should be used as part of the overall defense plan to slow, canalize, stop, and kill enemy armor. Some obstacles should be located to protect Dragon positions. For this purpose, maximum use should be made of natural obstacles.



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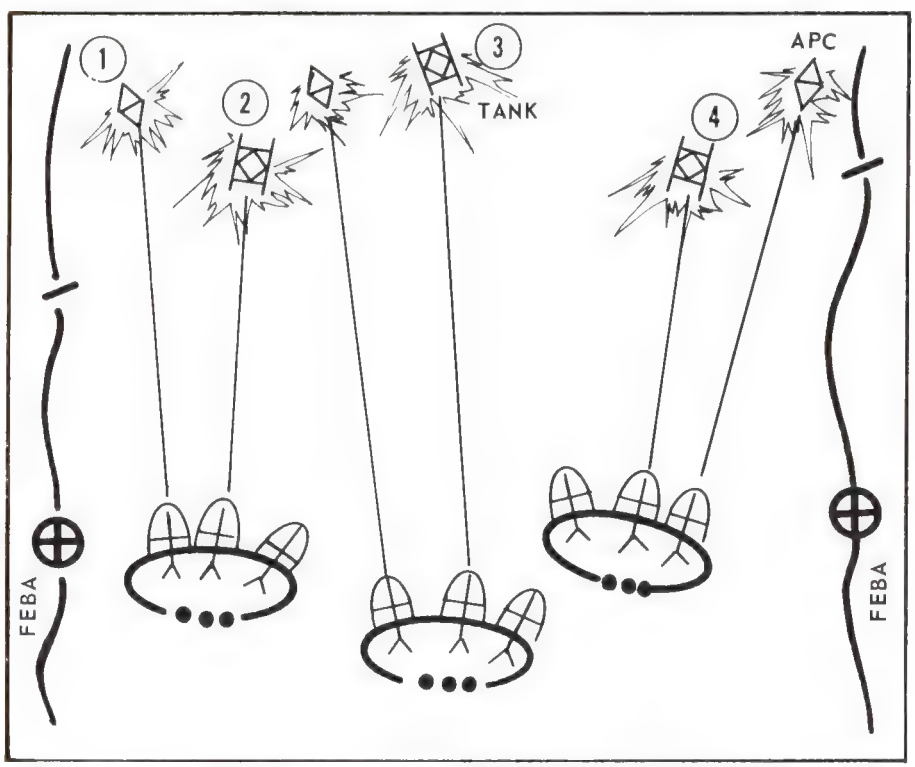

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Figure 9-6. Target engagement.

(2) Dragon positions should be selected, when possible, to drive attacking tanks into these obstacles and to take maximum advantage of flanking fire when tanks attempt to bypass them. Consideration should be given to placing Dragons to cover gaps and lanes in obstacles.

9-24. **Employment of Dragon with the Company Reserve.** Dragons of the reserve platoon are employed to add antiarmor depth to the company position and to protect the flanks and rear of the company. If practical, they are positioned to make use of their range and supplement fires of Dragons on the FEBA. The reserve platoon leader must give consideration to armor avenue of approach into the company position from other sectors of the battle area. Finally, Dragons located in the reserve area may be maneuvered to provide supporting fires for a blocking or counterattack force.

Section VI. EMPLOYMENT OF DRAGON IN THE RETROGRADE

9-25. **General.** This section discusses fundamentals for Dragon employment in retrograde operations. For the purpose of this section only delay and withdrawal actions are discussed.

a. A retrograde operation is a movement away from the enemy to avoid decisive engagement until the situation permits either defensive or offensive actions. There are three types of retrograde operations; they are delay, withdrawal, and retirement.

b. The rifle company normally participates in retrograde operations as a part of a larger force and may conduct delay, withdrawal, or retirement actions in a single action of the larger force.

9-26. **Employment of Dragon in delaying actions.**

a. The underlying principle of a delaying action is to gain time without fighting a decisive engagement while inflicting maximum punishment on the enemy. The delay positions are organized similar to the defense except that it may be necessary to extend frontages and reduce the depth of the position. The company will normally be ordered to withdraw after the desired delay and destruction of the enemy has been achieved, and before it is so heavily engaged that a withdrawal will be difficult and costly. After withdrawal, the company will either occupy: another delay position, a defensive position, or occupy an assembly area in preparation for future actions. The rifle company may be forced to accept close combat because of a local tactical situation where it must hold the enemy beyond a definite line until a stated time or action occurs in order to improve the overall situation. Mutual support will normally be maintained between platoon positions, though extended frontages may preclude mutual support between platoons within a company sector. The platoon will normally delay on successive or alternate company delay positions (fig 9-7). The following discussion applies to the employment of Dragon in the delay.

b. In the delay, targets are normally engaged at the maximum effective range; therefore, delay positions are normally located on or near the topographical crest of a hill, in order to take advantage of: the long range observation and fields of fire, and immediate masking of enemy observation and direct fires when the withdrawal from the position is ordered.

c. As the enemy armor comes within range, Dragon gunners engage the leading element at maximum range in an attempt to force his following armor units to deploy or mass on roads and trails. If the enemy allows his force to mass, the delaying force calls for every available means to destroy him in this vulnerable position. If not accomplished, the enemy is forced into the time-consuming task of deploying his force to attack the delay position.

d. The extended frontages, normal with the delay, require the leaders of the rifle company to give careful consideration to positioning Dragon weapons to cover armored avenues of approach into their delay position. Mutual support between Dragons in all of the platoons will be more difficult to achieve and will require added emphasis by the company commander to insure that all antiarmor fires are coordinated to achieve maximum delay.

e. When maximum delay has been achieved, Dragon weapons are withdrawn with their squad for movement to the new delay position. When there is considerable enemy armor forces and/or distance between delay positions, armor killer teams may be formed with Dragon weapons and positioned in ambushes between delay positions to delay the enemy s advance.

f. Planning considerations.

(1) *Reconnaissance.* Leaders must give special attention to selecting Dragon positions along the routes of withdrawal and at the next delay position during their reconnaissance. This is critical because of the rapid movement in the

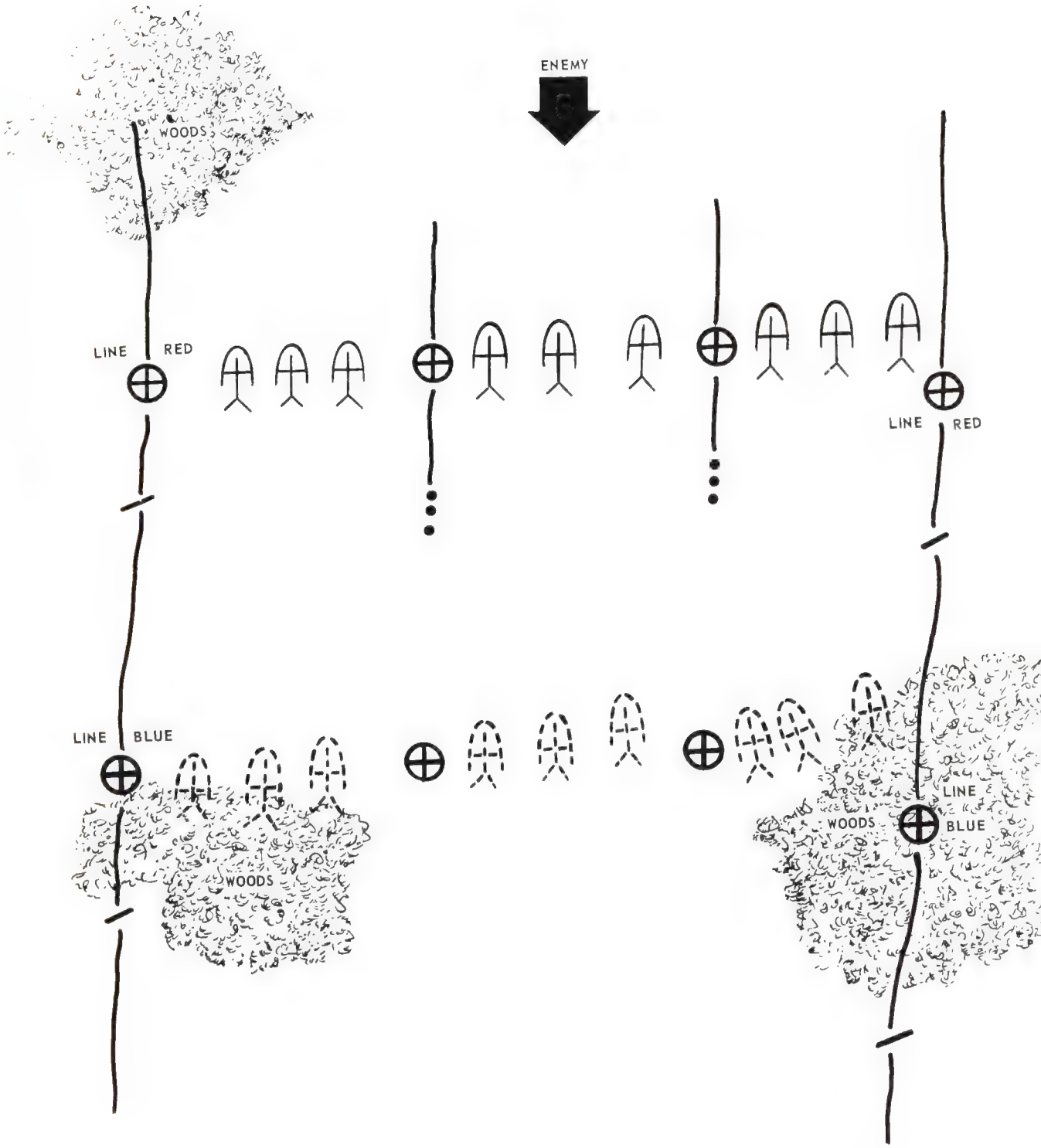

Figure 9-7. Platoons delay on successive positions, occupied and proposed positions indicated.

delay and the possibility that Dragons may be employed between delay positions.

(2) *Dragon ammunition.* Due to the high volume of ammunition expenditure in dela operations, provisions must be made to increas the number of rounds available to the Drago

gunner. It may be necessary to dedicate a vehicle to the task of carrying extra Dragon missiles. Consideration may be given to stockpiling missiles on subsequent delay positions. If this is done, plans must include provisions for destruction in the event the position cannot be occupied, and no means is available to evacuate the missiles.

(3) *Obstacles.* As in defensive operations, Dragon fires are integrated with natural and man-made obstacles. In the delay this becomes even more important because of the extended frontages normal in the delay.

9-27. Employment of Dragon in Withdrawal. *a. Conduct of Withdrawal Under Enemy Pressure.* The withdrawal is conducted to disengage the force from combat. It is ordered by a higher headquarters, and may be conducted not under enemy pressure (which is the preferred method), or under enemy pressure. Withdrawal under enemy pressure is the most difficult and least desired method; and if withdrawal is indicated, withdrawal under enemy pressure is planned first. As in the delay, after withdrawal from the position, the platoon will move to and occupy either: a delay position, a defense position, or an assembly arca, in preparation for future operations. The withdrawal under enemy pressure is the most dangerous and difficult to control of all tactical maneuvers. It is characterized by the forward elements fighting as they withdraw. Under these conditions, control of Dragon fires is decentralized and gunners withdraw with their squads. The reserve platoon may cover the withdrawal of the forward platoons of the company from the FEBA in the defense, in which case strict control must be maintained by the platoon leader over Dragon covering fires.

b. Withdrawal Not Under Enemy Pressure. When a detachment left in contact (DLIC) is designated, it continues normal activity to deceive the enemy and it covers the withdrawal of the main body. The DLIC is normally made up of a squad from each rifle platoon and no more than half the company supporting weapons. If tanks are attached, they are normally part of the DLIC. This type of operation is normally conducted at night or in reduced visibility conditions. In any situation, the success of the operation depends primarily on secrecy and deception. When the withdrawal of the DLIC is ordered, Dragons are withdrawn with their squads.

c. Selection and Preparation of Next Subsequent Position. During the company commander's reconnaissance, he selects assembly areas for the platoons. Platoon advance parties should select Dragon fire positions at the next subsequent position. These positions will be confirmed, and adjusted as necessary by the platoon leader, after the arrival of the main body of the platton at the position.

Section VII. AN OVERVIEW OF DRAGON TRAINING

9-28. Purpose. Successful application of the tactics and techniques for employing Dragon in battle depends on the effectiveness of each unit's Dragon training program within the unit's overall training program. It is neither practical nor appropriate to dictate a Dragon training program for a unit.

a. First, it is unlikely that a mandatory training program would fit each unit's circumstances and needs. This is true because only the unit commander is in a position to develop his unit's training program, using the following ten steps:

(1) Identify all of his unit's tactical and administrative missions.

(2) Analyze his unit's missions to determine the individual and unit capabilities (training goals) required to accomplish all missions; determine individual and unit tasks required to accomplish each training goal.

(3) Establish individual and unit training objectives.

(4) Determine the current level of individual and unit proficiency.

(5) Determine individual and unit training needed to attain the training objectives (step 3 above).

(6) Identify his available training resources.

(7) Determine individual and unit training objectives based on training resources available and individual and unit training needed.

(8) Program and schedule training.

(9) Conduct training.

(10) Monitor and evaluate training and then revise his training program as required.

Note: For an explanation of this ten-step process, refer to Training Circular 21-5-1.

b. Second, AR 350-1 delegates authority and responsibility for planning, directing, conducting,

and supervising training to the lowest command element having the ability to conduct effective training. In most cases, the AR indicates, this will be the battalion/separate company level. This training circular suggests an approach to Dragon training which will assist the commander to meet his training responsibilities as prescribed in Army training doctrine.

9-29. Performance-Oriented Training. The Army has developed and adopted new training doctrine characterized by its title of performance-oriented training. This doctrine requires commanders and their trainers to develop and use training objectives as they plan, conduct, and evaluate training. Training objectives are precise statements describing what task soldiers being trained are to do, the conditions under which the task is performed, and the training standard (i.e., the degree of proficiency) to be achieved. Because the development and use of training objectives is new to the Army, users of this publication may know neither the process used in developing training objectives nor why training objectives are critical to the development of a training program. To assist commanders and trainers to learn to write and use training objectives, the following publications have been developed and implemented:

a. TC 21-5-1

b. TC 21-5-2

c. FM 21-6, *How to Prepare and Conduct Military Training* (Test), December 1973. This manual supersedes FM 21-6, *Techniques of Military Instruction,* January 1967.

d. Development of a training extension course (TEC) which teaches the new doctrine expressed in FM 21-6.

9-30. Advantages in Training for Specific Needs. *a.* Concentration on the specific training needs of individuals and units provides a commander two important advantages as he plans and conducts his Dragon training.

(1) He can allocate his training resources more effectively.

(2) His soldiers can learn easier and faster.

b. Some of the reasons these advantages are accrued are explained in the following paragraphs.

(1) Due to the scarcity of training resources (insufficient time, instructors, ranges, etc., with which to conduct training), it becomes critical to identify the specific training needs of individuals, teams/crews, and units (squads and platoons). To train men (and units) to perform skills which are n essential to their job/duty performance, when tho same men (and units) have not yet mastered t fundamentals (essentials) of their jobs, is to was training resources. To spend training time (and oth resources) providing "nice to know" information soldiers is to assume that the men (units) are train to a degree of proficiency required for their jobs, c to assume that training resources are so abunda that you can afford to train on both essential a nice to know skills. The contention is that few unit if any, have mastered the essentials.

(2) Soldiers can learn easier and faster if the essential training needs for job/duty performan are recognized. During training a soldier is requir to learn new information, acquire new skills, a practice skills to attain or exceed established leve of proficiency. Consequently, those who plan a conduct training should insure that they do n include unnecessary information in a class or requi a soldier to practice an unnecessary skill. To do can only reduce the soldier's learning by forcing hi to sort out the essential from the nice to know, or force him to practice a skill he can already perform does not need to perform to complete a giv training objective.

9-31. Training for Specific Needs Allows f Multilevel Training. *a.* Based on the precedi discussion it should be apparent that skills (and t knowledge required to perform those skills) and sk proficiency depend on the job. For example, t skills and level of proficiency for a Dragon gunn differ from those of his fellow squad members, h squad and platoon leaders. Consequently, all these men do not need identical Dragon relat training. To illustrate this point further, figure 9 contains a few tasks which members of a platoo would do upon arrival at their assigned defensi sector.

b. Figure 9-8 illustrates that various job/du positions in a unit require different skills, a therefore different training. Recognition of this fa suggests the use of a multilevel training approac This approach is designed to train simultaneous different elements (the Dragon gunner, the squa the leaders) of the unit (e.g., the platoon) before t entire team "puts it all together" in a platoon company field training exercise (FTX). Applying t logic of the multilevel training approach to Drag training, it becomes obvious that a training progra could be developed for each of the followi categories:

The Platoon Leader.

1. Identifies enemy avenues of approach.
2. Assigns squad defensive sectors.
3. Selects firing positions for the platoon's Dragons.
4. Assigns Dragon sectors of fire.

Note: The knowledge and skill required to perform any of these tasks is considerable; for example, map reading, map and terrain analysis, knowledge of enemy armor capabilities in determining armor approaches, knowledge of the Dragon's range, backblast effects.

The Squad Leader.

1. Posts local security and posts the appropriate soldiers/weapons to positions selected by the platoon leader.
2. Insures that fields of fire are cleared/improved.
3. Insures that positions are prepared; correctly oriented on assigned sectors of fire; natural cover and concealment is used to advantage and improved.
4. Insures that range cards are prepared.
5. Coordinates with adjacent units to insure for mutual support.

Note: Like the platoon leader, the squad leader has specific tasks and considerable knowledge associated with each skill needed to perform his job. Although some of the tasks are similar to the platoon leader's, they differ in scope and degree of proficiency.

The Dragon Gunner.

1. Identifies/verifies his position and sector of fire.
2. Prepares his position (entrenches, camouflage and concealment).
3. Determines various points (terrain features) in his sector of fire which will serve as reference points during target engagement (e.g., maximum and minimum ranges).
4. Prepares range cards.
5. Improves positions/prestocks Dragon rounds.

Figure 9-8. Platoon member tasks.

(1) *Training of critical tasks performed by leaders.* Because team/unit performance is significantly affected by the decisions and actions of its leaders, the leaders should be trained to make critical (tactical) decisions before they train with their team or unit. Such leader training reduces the chance that the troops will be used as "training aids" for the leaders. Squad and platoon leaders can begin training in tactical operations requiring the employment of the Dragon by using one or more tactical exercise (e.g., command post exercise, terrain exercises, or terrain model exercises). In this manner the leaders can learn and practice their tactical skills without wasting their soldiers' time. Meanwhile, the soldiers can be learning how to perform their jobs under the direction of qualified officer and noncommissioned officer trainers.

(2) *Training of critical tasks performed by team and unit members.* The critical member of the team or unit in this case is the Dragon gunner. Although every man in the unit could be trained to prepare the weapon for firing, to launch the missile and track a target, only the gunner is trained to a high degree of proficiency in all of these skills. The Dragon is a simple weapon to operate, but skill in tracking a target requires repetitive practice with the Launch Effects Trainer (LET) (includes monitoring set and transmitter) to acquire a certain degree of proficiency and, thus, reliability as a gunner. Accordingly, they are trained to assist the gunner by preparing fields of fire for the Dragon position, clearing a backblast area to reduce the signature of the weapon, providing local security, prestocking Dragon rounds, etc.

(3) *Training of critical tasks performed by subunits.* The trainer concerned with Dragon training must insure that his subunits can perform critical collective tasks. For example, if the platoon is conducting a daylight attack of a fortified position, the rifle squads must be capable of moving from the LD using the appropriate formations.

9-32. Special Training Considerations for Dragon. Introduction of Dragon into a unit's weapons inventory presents commanders with three special training considerations. These considerations should be taken into account by commanders as they prepare Dragon training programs. The three considerations are discussed in the following paragraphs.

a. Dragon is Different. Dragon is not only a new weapon, it is also a weapon with new characteristics, capabilities, and vulnerabilities. If unit leaders are to

employ Dragon effectively, they must learn the new aspects of the weapon and how these aspects influence weapon employment. For example, the Dragon differs from the 90-mm recoilless rifle (and in some cases the 106-mm recoilless rifle) in that it (the Drogon) has a greater range, a higher hit/kill probability, and a night sight. These differences are seen as advantages of the Dragon over the 90-mm recoilless rifle, but there are other differences which can be seen as disadvantages. A few examples would include the loss of the 90-mm recoilless rifle's antipersonnel round and the bulk (not the weight) of the Dragon round with its subsequent reduction in the number which can be carried by dismounted infantry (fig 9-9). Another significant difference is the Dragon gunner's vulnerability during tracking. Although both the 90-mm recoilless rifle and the Dragon have backblast signatures (which is a cue for enemy detection), the 90-mm recoilless rifle gunner, unlike the Dragon gunner, can take cover immediately after firing (shoot and scoot). The Dragon gunner must shoot and track; this increases his vulnerability to the enemy's counterfires.

Figure 9-9. Carrying the Dragon.

b. Gunner Qualification Versus Familiarization. In a unit with a high priority antiarmor mission, the commander may decide that every man in the unit should be able to use the Dragon (e.g., prepare the round for firing, acquire a target, launch the missile and keep the crosshairs on the target until missile impact). Because even this type of "familiarization" training represents an investment of training resources, the commander should know what degree of proficiency he is getting for his investment. Commanders must realize that training men to fire the weapon does not constitute gunner qualification.

Gunner qualification is based primarily on proficiency—the ability of the gunner to successfully crack targets consistently. Acquiring this proficiency requires a considerable amount of *time* (a critical resource) practicing on the LET, a training device (also a resource) of limited availability (three LET per battalion). Commanders must therefore *determine* who will become the unit's qualified gunners and what training resources can be allocated to their training. With this determination made he can then determine what training resources are available for the "familiarization" training for other unit members.

c. The Dragon Gunner—Double Duty. Because there are no dedicated Dragon gunners identified by either TOE or MOS for the Dragon weapon system, unit commanders will face unusual training problems. Commanders will not have the benefit of assigning the weapon to specially trained, MOS qualified personnel, but rather, will have to designate soldiers from their own resources to use the weapon. Unlike a recoilless rifleman, whose primary job and training are centered around that particular weapon, the Dragon gunner will have to be trained to use the Dragon as an additional skill—he must also be trained and retain his proficiency as a rifleman/grenadier/etc—as part of the rifle squad. There will be occasions when he will be called upon to be an individual squad member, armed with his normal weapon on one day, and a Dragon gunner—either singly or as part of a team the next day.

(1) Due to the scarcity of training resources, it will be extremely difficult to insure that soldiers are properly trained in both functions. Additionally, commanders must now inject a new aspect into their unit training—and that is the use of Dragon within the platoon and squad as part of a team. Squad leaders and members must be trained to adapt to a situation wherein they employ the Dragon on one occasion—and train without it on another.

(2) Because the weapon does not "belong" to a particular person in the sense that a 90-mm recoilless rifle or M60 machinegun "belongs" to a gunner, the tendency to leave the weapon in the arms room during field training will be natural. Commanders can require the use of Dragon during training by including Dragon related training objectives in the training program.

(3) Company commanders and platoon leaders must identify soldiers within their units—at a minimum one per squad or three per platoon—who will be the Dragon gunners. Once these people have been selected, they must habitually train with the weapon (or the field handling trainer) during unit training—unless, of course, the unit is conducting specialized training wherein little or no emphasis need be placed on antiarmor training—such as jungle or mounting training.

(4) In light of the preceding paragraphs, commanders must recognize that seldom will they have sufficient training resources to achieve the ideal; a fully qualified Dragon gunner who is also a proficient squad member—rifleman, grenadier, or AR man. If he attempts to achieve the ideal with insufficient resources, he may end up with both a poorly trained Dragon gunner and a poorly trained squad member. Consequently, a commander's resources may force a choice between having a qualified gunner or a proficient squad member who is not gunner qualified. The commander should make this choice based on his established training priorities which are, in turn, based on his unit's mission (e.g., because his unit has a high priority antiarmor mission, he elects to commit resources to train qualified gunners. The soldier's squad member training then becomes a poorly resourced second priority).

9-33. Suggested Approaches to Dragon Training for Leaders and Commanders. *a. General.* Dragon training for leaders and commanders begins by determining the specific Dragon-related tasks that each leader or commander must be able to perform. Once these tasks are developed into training objectives, the trainers can select appropriate training methods consistent with the available resources and other training requirements. Assuming that the leaders and commanders initially know very little about how to employ Dragon, training should progress from the basic to more difficult aspects of Dragon employment. In this case, the place to start may be the presentation of information in the classroom.

b. Classroom Type Presentation. Initial Dragon instruction can be conducted in a classroom without wasting a lot of training resources (ranges, transportation, etc.). Lectures, seminars, small discussion groups, and briefings lend themselves to classroom presentation. In addition, seminars and discussion groups are particularly useful in *formulating and explaining the integration of the Dragon weapon into the unit's standard operating procedures.* This approach will prove useful at company level (with the commander and his platoon leaders), at battalion, or even brigade level. Once the basic material has been discussed and understood, the instruction can progress to integration of Dragon training into exercises using other organic and attached supporting weapons, such as the TOW. This includes sandtable exercises, map exercises, terrain exercises (to include terrain walks and tactical exercises without troops (TEWT)), and command

post exercises (CPX's). In each instance, leaders—platoon leaders and company commanders in particular—should be required to integrate the use of Dragon with other weapons during a particular type of tactical operation. In order to do so, the leaders must know certain capabilities and limitations of the weapon (those that were presented in the classroom) and be able to apply the knowledge during tactical training. These include—

(1) Capabilities of the weapon to include:

(a) Effective range out to 1000 meters.

(b) Can defeat any armored vehicle.

(c) Can be used against fortifications if necessary.

(d) Can be used effectively at night with night sight but at a reduced range.

(2) Limitations of the weapon, to include:

(a) It is a line of sight system and must have an unobstructed flight path.

(b) Launch signature is a significant detection cue to the enemy.

(c) Gunner remains vulnerable to counterfire during missile tracking.

(d) Minimum range of engagement.

(e) Limited number of missiles can be carried due to weight and bulk.

(f) Limited training devices.

(3) Being able to evaluate terrain, to include:

(a) Selection of armor avenues of approach into his position.

(b) Selection of firing position(s).

(4) Logistic requirements of the weapon—when, how and where to obtain resupply of missiles.

(5) The necessity to provide security for Dragon gunners, and how this is accomplished (teams, obstacles, etc.).

(6) The requirement to provide a means of communication—either radio, land-line or SOP signals, etc.—between gunners and leaders.

(7) Knowledge of the state of training of his gunners and his training resources.

9-34. Dragon Gunner Training. *a. How Gunner Training Differs From Leader Training.* There is a difference between the tactical employment of Dragon and technical aspects of their operation, maintenance and firing. While Dragon employment during tactical operations is for the most part a conceptual process for platoon leaders and company commanders, execution of their concepts is basically a mechanical process for the Dragon gunners. Gunners need to be trained on the following aspects:

(1) Marksmanship. This includes the ability to fire the weapon and track the target until missile impact, day and night (use of night sight).

(2) Target identification. Gunners must be able to distinguish between enemy and friendly vehicles at ranges out to 1500 meters, under varying fiel conditions (rolling hills, vegetation, etc.), movin and stationary.

(3) Gunners must be able to determine that moving target, if engaged, will be in view lon enough to track the missile until impact. In th defense this is primarily a function of range car preparation.

(4) Preparation of a firing position, to includ range card preparation.

(5) How to minimize the effects of backblast

(6) The ability of the enemy to place suppressiv fires on his firing position, thus requiring his use o cover and concealment, deception, surprise movement, etc.

(7) Unit SOP's covering rules of engagement, t include such items as signals to lift or shift fires priority of targets, when to engage targets, etc.

(8) Where to obtain resupply of missiles.

(9) How to inspect the round before firing.

b. Centralized Versus Decentralized Gunne Training. The decision to use centralized o decentralized gunner training is contingent upo available training resources (e.g., equip ment/facilities, personnel, and time) and the type o tasks to be taught.

(1) Limited training resources may dictate centralized approach.

(a) Equipment/facilities. An excellent cas for centralized training can be made based on th distribution of the Dragon, the M47 Syste Training equipment, Training Equipment Set. Thi set consists of the XM 54 Launch Effects Traine (LET), the AN/TSQ-1 monitoring set, and an I transmitter T-M84. Eventually, the package ma include a Launch Signature Simulator. The propose distribution for the training package is 3 LETs, monitoring sets and 1 transmitter per battalion There also exists a field handling trainer, which is dummy round, to be issued on the basis of one pe tracker. This limited distribution of the training set suggests centralized control of training at th battalion (or brigade) level. Also, the number o firing ranges suitable for the Dragon weapon ma dictate centralized control over these facilities.

(b) Personnel—lack of qualified dragon in structors. Because the Dragon is a new weapon there are, temporarily at least, few qualified in structors who can teach Dragon-related classes. Thi shortage is compounded by the number of soldiers throughout the battalion (3 per platoon as a minimum) who need to be trained for gunner qualification and the need to train as many men as possible to fire the weapon.

(c) Time. A unit can conserve training time by centralizing the conduct of Dragon training. Cen-

ralized training requires fewer trainers and classes. f the training is centralized at brigade level or igher, battalion and company level trainers can levote their time to other training requirements. Finally, centralized training permits the use of qualified Dragon trainers to prepare and conduct raining. These men will need less time to prepare Dragon instruction than unqualified Dragon rainers.

(2) Types of tasks to be taught. The wise trainer vill consider, in addition to his resources, the types of tasks to be taught as he decides between a cenralized or a decentralized approach. If the task is elated to gunner marksmanship training or qualification, the trainer may be forced to use a centralized approach because of the limited number of training sets and ammunition. But if the task is to prepare range cards, a decentralized approach may be better. Once the Dragon gunners learn the basic considerations for preparing range cards, the raining task becomes one of practicing the application of these considerations to different pieces of errain (or even terrain substitution; i.e., maps, sandtables, 35-mm slides of terrain, etc.). Such practice can be enhanced by working in small groups vhere soldiers will have the opportunity to ask questions, discuss answers, and debate the advantages/disadvantages of the range cards.

c. Training Techniques. Several types of gunner raining techniques are applicable.

(1) *County-fair.* Because of the limited number of training sets in the battalion, all gunners cannot practice simultaneously. Rather than having only a ew gunners practicing on the trainer while other soldiers watch, a "county fair" could be used to keep ll the soldiers engaged in productive, active raining. The "county fair" concept is nothing more han a series of concurrent training stations through vhich platoon members rotate. Station number 1 nay be for the training equipment set, station number 2 may require preparation of range cards, station number 3, identification of enemy tanks hrough use of flip charts, and so on (fig 9-10).

(2) *Night training.* Because aggressor doctrine tresses night operations, designated gunners eventually should practice their skills at night. This an be accomplished both during field training exercises using the field handling trainer with the night sight, on a range (under controlled conditions) nd using artificial illumination to illuminate argets.

9-35. Dragon Team Training. Because of the frequent necessity for squad leaders to employ Dragon as part of a team, team training must become an integral part of training with Dragon in the field. As a rule, when Dragon gunners are employed apart from their squad positions, they will have at least one assistant gunner/ammunition bearer accompanying them, or may even be employed in an antiarmor fire team. The other members of the team must be able to work with the gunner as a coordinated element. Their duties include providing security for the gunner, assisting the gunner in preparing his firing position(s), carrying ammunition (missiles), and locating targets. In order to simplify training, members of the gunner's own fire team within the squad should habitually be used to form the team.

9-36. Training as Part of the Unit. Once gunners are trained and qualified with the weapon, and leaders are trained in the tactical employment concepts of the Dragon, leaders and gunners can train together profitably during field exercises. During the conduct of such training, leaders must be forced to make decisions concerning the employment of the weapon; this can be done through the use of scenarios, simulated threat conditions, the use of aggressor forces, etc. Based on these simulated conditions, platoon leaders practice choosing armor avenues of approach, selecting Dragon firing positions, and all the other elements of employing the weapon. Platoon and squad leaders, in turn, should require their gunners to prepare firing positions, range cards, and simulate engaging targets. Employing them with their squads provides training for other squad or fire team members' duties (providing security, locating targets, etc.). The training exercises should be critiqued and discussed with the purpose of determining if the techniques and tactics were the best possible for the situation.

9-37. Realism in Training. *a.* When qualifying on the range, Dragon gunners normally learn under almost ideal conditions—they have excellent fields of fire, the target (IR source) drives back and forth in front of them on level ground, and there are no distractions other than fellow gunners firing their weapons. Once the Dragon gunner has qualified on the range, he is ready for more advanced training. This advanced training consists of requiring him to use Dragon under increasingly difficult yet realistic conditions. Such conditions must be created during training by the commander. A few examples of how to add realism to Dragon training are discussed in the following paragraphs.

b. During both field training exercises and practice firing exercises on the range, gunners should be exposed to distractors. These include the detonation of explosives to simulate enemy artillery and tank fires near his position. The use of smoke, both on or near the gunner's position, or target, also add to realism. (A good technique to simulate close-in explosions is the use of explosives under a bag of

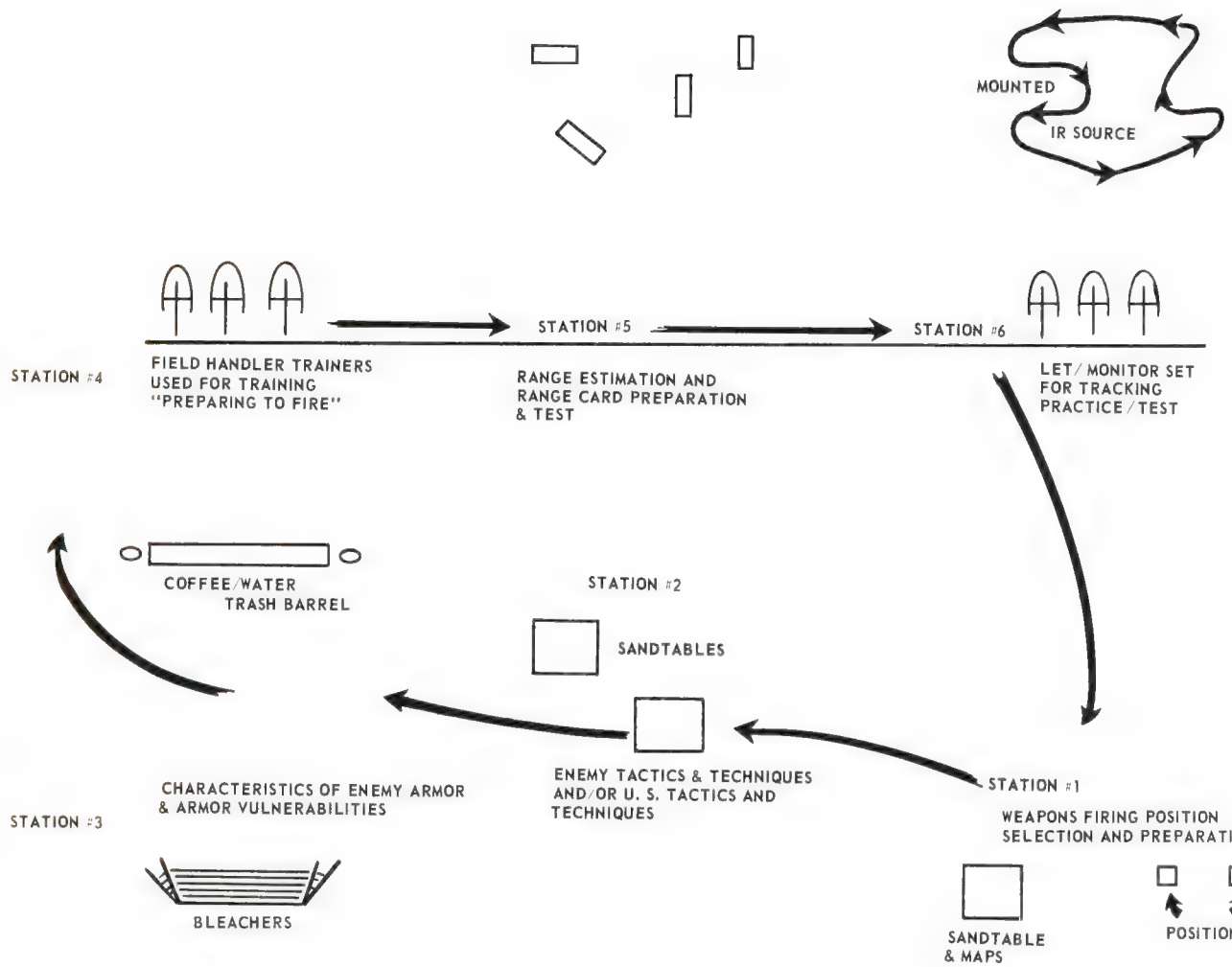

Figure 9-10. County-fair.

flour.) Such items tend to distract gunner attention and resemble to some small degree the type of interference he would be faced with on the battlefield. Smoke will obscure the target, making tracking more difficult. Gunners will have to concentrate on tracking their targets under varying degrees of smoke, haze, and harassing fires.

c. During tracking exercises, the target vehicle mounting the infrared transmitter must be used over representative terrain—thus the target would move towards the gunner's position over rolling, wooded terrain, curving roads, etc. Simply driving the target vehicle back and forth across a flat field in front of the gunner provides marginally effective training and should be used seldomly once gunners have been qualified on the weapon.

9-38. Evaluation. *a.* Every trainer has as one of his major responsibilities the requirement to evaluate training. The training to be evaluated may be that which the trainer conducted himself, training conducted by his assistant trainer(s), or training conducted by another trainer.

b. The evaluation is concerned with two aspects: the effectiveness and the efficiency of training. The effectiveness of training is determined by whether the soldiers, teams, or units meet the standards established in the commander's training objective(s). The efficiency of training is concerned with how the trainers used the available training resources.

CHAPTER 10

STORAGE, MAINTENANCE, AND WEAPON SECURITY

Section I. SHIPMENT AND STORAGE

10.1. Round Shipment and Storage. *a.* The instructions and precautions presented in this section are intended specifically for the Dragon missile installed in the launcher, which is considered a complete round of ammunition for handling and storage.

b. The Dragon round is shipped and stored in a wooden container (fig 10-1). This container provides protection for the packaged round from shock, vibration, and mishandling. The launcher provides physical protection to the missile after the ROUND is removed from the container. The ROUND should always be handled as a complete round of ammunition and under no circumstances should any personnel attempt to disassemble it.

c. The following precautions should be observed

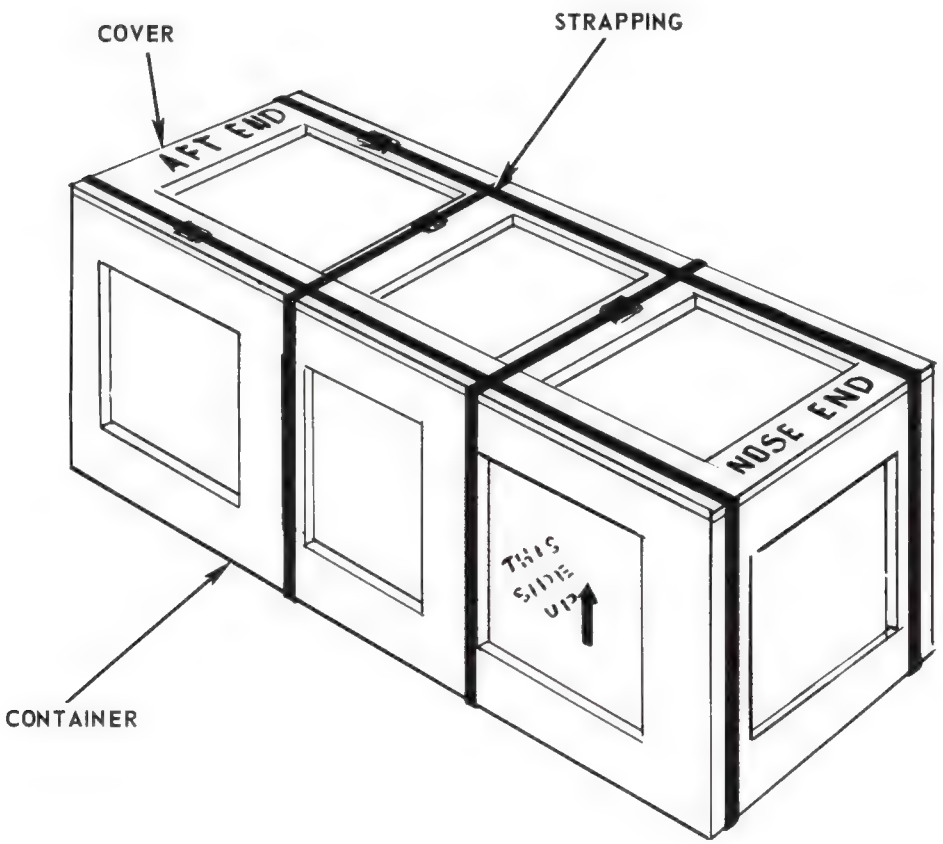

Figure 10-1. Dragon shipping container.

during the handling and storage of the DRAGON ROUND:

(1) Do not attempt to remove the missile from its launch tube.

(2) Do not subject the ROUND to rough handling or dropping. Such handling could result in a malfunction when the missile is fired.

(3) Always protect the ROUNDS in storage from direct sunlight, weather, and moisture. Use at least 6 inches of dunnage under the wooden shipping containers and place a waterproof covering over and around the containers.

(4) Shelters provided should be adequate, well ventilated, and easily accessible.

(5) The nose end of all shipping containers in a storage area must be pointed in the same direction presenting the least danger to personnel or equipment in case of fire or explosion.

(6) Storage facilities for the ROUND and TRACKER should include provisions for keeping the temperature within the range of −65° to +155° Fahrenheit.

d. The Department of Transportation (DOT) classification for the Dragon missile M222 (HEAT warhead) is Class A explosive. The DOT classification for the Dragon missile M223 (INERT warhead) is Class B explosive.

e. Building and area requirements for peacetime storage are dictated by quantity-distance and compatibility classifications for the Dragon round. For detailed information concerning the handling and storage see TM 9-1300-206. Table 10-1 lists the shelf life, quantity-distance class, compatibility groups, and DOT class for the Dragon round.

10-2. Tracker Shipment and Storage. The Dragon tracker is shipped in a steel container (fig 10-2). This container provides protection from rough handling and weather.

Table 10-1. Dragon Round Shelf Life

Component	*Round in Container*	*Out of Container*	*Quantity Distance Class*	*Compatibility Class*	*DOT Class*
DRAGON MISSILE M222	5 Years	1 Year	3	F	A
DRAGON MISSILE M223	5 Years	1 Year	2	F	B

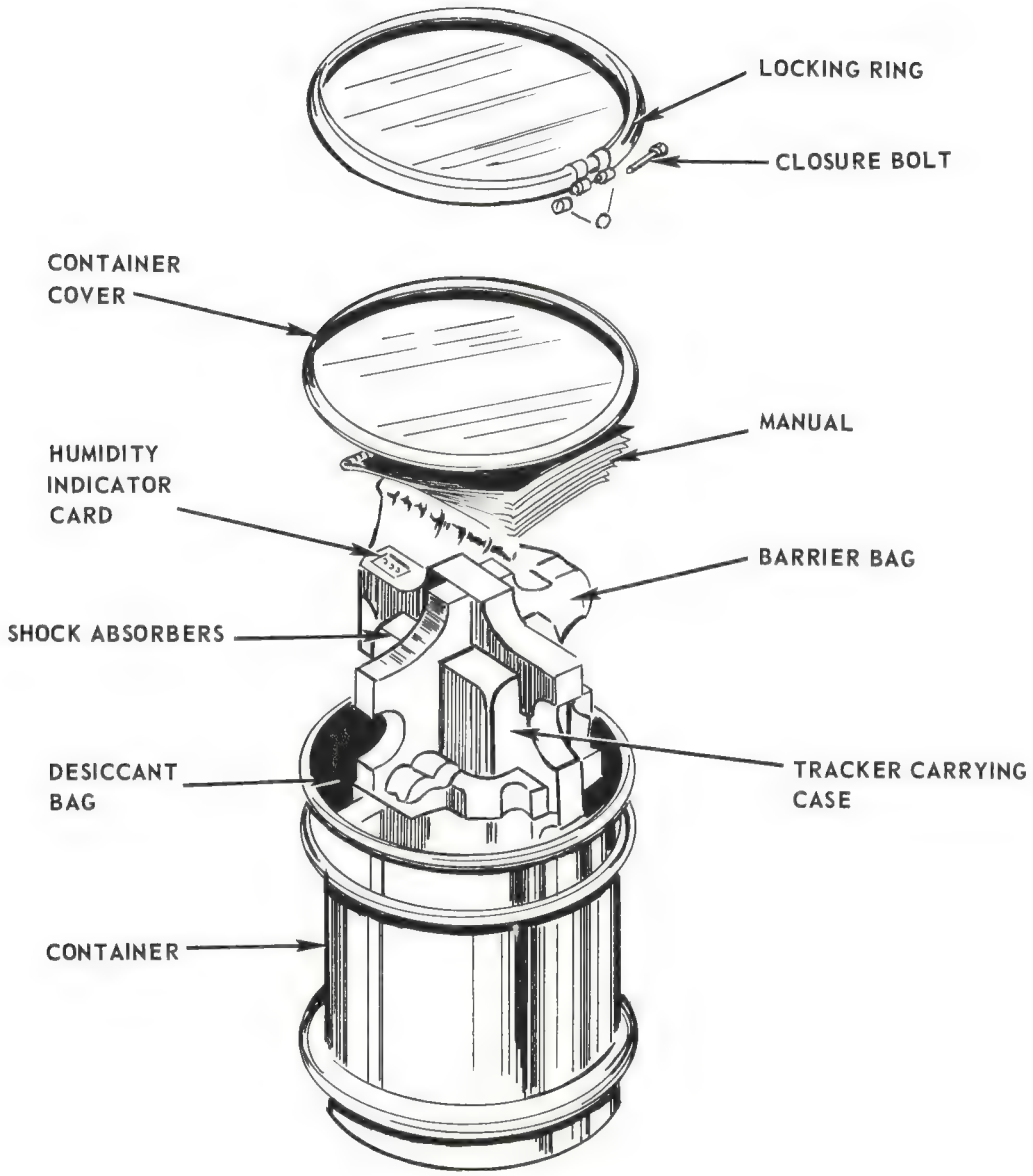

Figure 10-2. Tracker shipping and storage container.

Section II. MAINTENANCE

10-3. Care and Cleaning. The Dragon gunner must perform preventive maintenance procedures on his equipment. Preventive maintenance will insure proper functioning and increases operational life of the weapon system.

Warning: **Do not perform any maintenance with the tracker mated to the round.**

a. Metal Parts. Use clean, dry rags to remove dust, dirt, grease, moisture, or other foreign matter from the launcher units and tracker.

b. Rubber/Synthetic Parts. Use mild detergent and water, then dry the parts using a clean absorbent wiping rag.

c. Carrying Straps. Use a stiff brush to brush debris from webbing. If a brush does not remove the debris, use a mild detergent and water.

d. Fiberglas. Use a mild detergent and water and dry with a clean absorbent wiping rag.

e. Glass. Use a few drops of ethyl alcohol on a sheet of lens tissue and apply light pressure in a circular motion. (Required items are in the tracker cleaning kit in the carrying case.)

Caution: **Do not clean the tracker lens with rags or other materials that may scratch the tracker lens.**

10-4. Equipment Record System (Logbook). The logbook issued with each Dragon and item of equipment is used to keep an accurate record of the equipment.

a. The Logbook Includes—

(1) Equipment log assembly (DA Form 2408).

(2) Equipment control record (DA Form 2408-9).

b. These Records Provide:

(1) Up-to-date information of the material readiness of the equipment.

(2) Information on the status of maintenance of the equipment.

10-5. The Round. *a.* The gunner will inspect and clean.

(1) Inspect launcher tube for gouges, cracks, punctures, and visible damage. Inspect external surface for accumulations of dirt, oil, grease, or other foreign material.

(2) Bipod and retaining strap—Check for security of the bipod and retaining strap to the launch tube, and visible damage.

(3) Forward shock absorber—Inspect forward shock absorber assembly for security, cracks, punctures, and visible damage. Inspect humidity indicator card via viewport in the face of the forward shock absorber assembly. Check that none of the indicator circles are pink.

(4) Tracker support and connector—Inspect moisture seal cover and lanyard for dirt or breakage. Inspect tracker support assembly for security on launcher, bends, dents, and security of spring tension clip and electrical connector. Remove moisture seal cover and inspect electrical connector for bent, broken, or cracked contact cover. Install moisture seal cover. Inspect raceway conduit wire harness from tracker support assembly to aft shock absorber for dents, cracks, punctures, and visible damage.

(5) Tracker battery—Inspect electrical cable nipple covering tracker battery for security and cracks.

(6) Sling—Inspect sling for rips, tears and security.

(7) Aft shock absorber—Check aft shock absorber for security, cracks, punctures and visible damage.

b. Check for operation.

(1) Bipod—brake, leg extension, brace and spring—Check bipod for freedom of movement security, and visible damage. Unfasten and extend bipod. Insure there is no binding and that the forward brace locks in position. Insure that bipod swivels 45° to either side and realines to the center position when released. Insure that the lower tube assembly slides easily up and down and that the friction brake locks at random positions. Insure that the leg assembly extension foot mountings extend properly and lock at random position.

(2) Sling—adjustable.

10-6. The Tracker Table 3-1. Gunner will inspect and clean.

a. Tracker—Inspect tracker external surface for accumulations of dirt, oil, grease, or other foreign material. Inspect shock absorbers for security, punctures, cracks and visible damage. Inspect tracker access cover on bottom of tracker for dents or bent cover. Inspect guide pins for bent or distorted condition.

b. Optical components—Inspect the transparent lens cover and lanyard for dirt or breakage. Remove transparent lens cover and visually inspect infrared receiver lens and optical sight lens for dirt, breakage, cracks or chips.

c. Firing mechanism—Security, trigger boot for security and tears and punctures, safety button boot for security and tears and punctures.

d. Connector—Inspect protective cover and lanyard for dirt or breakage. Remove protective cover and inspect electrical connector for bent, broken, or cracked contact cover. Install protective cover.

10-7. Launch Effects Trainer. *a.* Inspect and clean as necessary.

(1) Inspect external surface for accumulations of dirt, oil, grease, or other foreign material and clean as appropriate. Inspect for security, punctures, dents, and distortions.

(2) Bipod and retaining strap—Inspect for rips, tears and general condition of mounting and adjustment hardware.

(3) Battery access cover for security, seal, and retaining cables.

(4) Battery tubes for contamination, battery contacts, and tension block and clutch.

(5) Tracker support assembly and connector—Inspect for loose or missing mounting screws. Inspect the spring retainer clip for distortion, bends and loose or missing rivets. Remove tracker support electrical connector moisture seal cover. Inspect the electrical connector for bent, broken or cracked contact cover. Replace moisture seal cover.

(6) Shock absorbers, forward shock absorber—Remove and inspect for punctures, cracks, dents and distortions. Check for loose mounting pins. Check for blistered or chipped paint.

(7) Aft closure end cap assembly—Remove and inspect tension fasteners. On the cap check for loose, bent or distorted studs. Check for blistered or chipped paint. Inspect for security, punctures, cracks, dents and distortion. Check stud receptacles for spring tension. Check for blistered or chipped paint. To replace damaged aft closure shock absorber—remove aft closure end cap assembly. Remove two machine screws, two flat washers, and aft sling retainer. Remove four machine screws, four flat washers, and two eye nonrotating brackets. Remove machine screw and spring lockwasher. Remove nine machine screws, nine flat washers, and aft closure shock absorber.

(8) Sling—Inspect sling for rips, tears, worn places and security.

(9) Breech and firing mechanism—Open breech, insure that breechblock latch, breechblock lock release lever, and safety lever operate. Inspect to insure there is no foreign matter in openings. Use the small arms chamber brush to clean as required. Assemble tools and materials required to disassemble, clean and reassemble the trainer. Remove aft closure end cap. Open breechblock. Remove small arms chamber brush. Remove lockpin from cartridge chamber. Rotate breechblock clear of cartridge chamber by pulling to the rear and up. Rotate cartridge chamber counterclockwise and remove it from the pressure tube. Use the small arms chamber brush, saturated with cleaning solvent or soapy water, to clean chamber and exhaust holes. Use the small arms chamber brush, saturated with cleaning solvent or soapy water, to clean gas vent holes.

Warning: **Exercise care when handling the dummy projectile. Serious injury to personnel may be sustained if the projectile is allowed to fall.**

(10) Weight shift mechanism—Inspect forward end support fitting cap for security. Inspect electrical connector receptacle for bent or missing pins. Unfasten and extend bipod. Remove forward shock absorber. Unscrew forward end fitting and remove from pressure tube. Inspect for damaged threads. Using a clean wiping rag dampened with a cleaning solvent or soapy water, clean front and back surfaces of the forward end fitting cap. Dry with a clean absorbent wiping rag. Brush out the orifice with the small arms chamber brush. Use the cleaning brush handle to force the dummy projectile out the forward end of the pressure tube. Remove the compression rings from the dummy projectile. Use a clean wiping rag dampened with cleaning solvent or soapy water to clean the dummy projectile and compression rings. Particular attention should be given to cleaning compression ring grooves. Dry all surfaces with a clean absorbent wiping rag. Attach the cleaning brush to the cleaning brush handle and saturate the cleaning brush with cleaning solvent or soapy water. Insert the brush into the aft end of the pressure tube. While turning the handle in a clockwise direction, push it through the pressure tube. Remove the cleaning brush from the handle. Insert a clean wiping rag into the post slot and pull it through the pressure tube. Repeat these steps as required to insure that the area between the weight stop sleeve and the support sleeve is thoroughly clean and dry.

b. Check for operation.

(1) Bipod—Unfasten and extend bipod. Insure there is no binding and that the forward brace locks in position. Insure that the bipod swivels 45° to either side and realines to the center position when released. Insure that the lower tube assembly slides easily up and down and that the friction brake locks at random positions. Insure that the leg assembly extension foot mountings extend properly and lock at random positions.

(2) Weight shift mechanism—Use the cleaning brush handle to slide the dummy projectile into the reset position. Lower the forward end of trainer and insure that the dummy projectile remains in the reset position.

(3) Firing and safety mechanism.

10-8. Monitoring Set. *a.* Inspect and clean as necessary.

(1) Overall structure—Inspect for dents, perforations and abrasions. Check for chipped or blistered paint.

(2) Case assembly—Latches and handles Check for excessive wear or damage. Inspect cover latches for secure fit, no looseness in joints. Pressure equalizer valves—Check for general condition and ease of operation.

(3) Cover assembly (internal)—Open cable storage area by releasing three fasteners and raising door. Check hinges and fasteners for ease of

operation. Release tie downs and remove cables. Check elastic cords and straps for physical damage.

(4) Control panel—Inspect for dirt, oil, grease or other foreign matter. Check water seals and dust boots for damage. Visually inspect for damage. Rotate/set and controls to check for freedom of movement. Return applicable controls to OFF or AUTO. Remove covers from POWER INPUT J1, LET J1, RECORDER J2 and MON SET TEST J3 receptacles. Check for bent or missing pins or other damage. Replace covers.

(5) Cables and connectors—Inspect each cable for completeness, damaged insulation or other visible damage. Check for presence of dirt, grease or other foreign matter on cables. Remove dust covers from connectors and check for bent or broken pins or other visible damage.

b. Check for Operation.

(1) Indicator lights—Set INTERNAL POWER switch to ON. Place LIGHTS TEST switch to TEST. The following lamps will illuminate: TARGET RANGE (1 through 10), IR XMTR, TRIGGER, OFF TARGET (DN, UP, L and R), HIT, MISS.

(2) Batteries—Continue to hold LIGHTS TEST to TEST and set METER selector to +VOLTS, meter needle will indicate within green band. Set METER selector —VOLTS, meter needle will indicate within green band. Release LIGHTS TEST switch, it will return to OFF position. Set METER selector to OFF.

(3) Battery charger—Check for illumination of fuse indicators.

(4) Control switch.

10-9. Infrared Transmitting Set M89. *a.* Inspect and clean as necessary.

(1) Overall structure—check for accumulations of dirt, oil, grease, or other foreign matter. Check exterior for breaks, cracks, distortions, or other evidence of damage. Check all areas where component parts attach to each other (fig 5-10) for serviceability and for evidence of damage or wear, bent or broken connector pins. Check for rust or corrosion, and missing, chipped or blistered paint. Check for missing parts.

(2) Target source. Interior—Remove the target source from the support. Remove the inlet and exhaust filters by unscrewing the thumbscrews on the filter covers and inspect the filters for cleanliness. Exterior—Check the surface of window for cleanliness. General—Inspect connector J1 for dirt or damage.

(3) Power Supply/Modulator.

(*a*) Electronic case assembly—Check case cover for proper opening and latching, and the case handle for excessive wear.

(*b*) Panel—Inspect panel for damage and foreign material.

(*c*) Inspect connectors J1, J2, and J3 for dirt or damage.

(*d*) Humidity indicator—Inspect that humidity indicator is blue.

(4) Target Board—Inspect target board for dirt or damage.

(5) Target Support—Inspect target support for dirt or damage.

(6) Cables—Visually inspect cables for broken connectors, broken pins, or other damage.

(7) Mounting Kit.

(*a*) Tie down straps—Check for frays, tears, security of hooks and overall serviceability.

(*b*) Universal adapter—Check for any visible damage and insure all the bolts, nuts, and washers are present.

b. Check for operation (para 5-15).

(1) Target source cover.

(2) Target support clamp.

(3) Tie down straps.

(4) Controls and indicators.

(5) Target source.

Section III. WEAPON SECURITY

10-10. The Dragon Tracker and Round is a Complete Guided Missile System. Continuous safeguarding of the weapon system and the DRAGON training equipment is of paramount importance. The tracker and round are sensitive items. The Dragon training equipment is unclassified.

10-11. Safeguarding the Dragon. *a.* The Dragon and the Dragon training equipment will be safeguarded in accordance with AR 380-5, chapter 5.

b. Physical security must be maintained at all times in areas where Dragon systems are located.

10-12. Personnel Clearance. *a.* Granting of security clearances to personnel for access to the Dragon will be as directed by AR 604-5, chapters 3 and 4.

b. Limited access to classified or sensitive areas will be established by responsible commanders also in accordance with AR 604-5.

CHAPTER 11

DECONTAMINATION AND DESTRUCTION OF MATERIEL

Section I. DECONTAMINATION

11-1. **General.** Dragon crews must develop and maintain a capability for accomplishment of their mission while subject to nuclear, biological, or chemical (NBC) attacks. This chapter describes the procedures that the Dragon crew must take to decontaminate its equipment following an NBC attack.

11-2. **Decontamination Principles.** *a.* Decontamination is accomplished by the removal, absorption, neutralization, destruction, or burial of toxic agents.

b. In decontamination operations, all soldiers must avoid personal contamination.

c. The materials used in rubbing or blotting contamination agents should be burned, buried, or otherwise destroyed.

d. The materials used to remove radioactive contamination should be buried.

e. When protective ointment is used for the emergency decontamination of personal equipment, the adequacy of the treatment should be tested to avoid a later hazard. After an hour or more, the equipment should be rechecked with a detection device.

11-3. **Decontamination Procedures.** *a.* Decontaminate as prescribed by FM 21-40.

b. Dragon components which are contaminated with chemicals other than blister agents (V- and G-series) are decontaminated by airing. For faster decontamination, apply DS-2 decontaminating agent.

c. Dragon components contaminated with blister agents (V- and G- series) are decontaminated as follows:

(1) Remove all dust, dirt, grease, and oil.

(2) Expose all components to air.

(3) Decontaminate all equipment with DS-2 decontaminating agent. Hot, soapy water is also effective

(4) Use protective ointment M5 for emergency decontamination.

(5) Test with detector kit to determine if decontamination is complete.

(6) Bury (or burn) all rags or wiping materials. Exercise caution to protect troops against vapors created by burning.

(7) As soon as possible after using DS-2 to decontaminate the weapon system must be cleaned with a mild soap and water solution and must be thoroughly rinsed.

Section II. DESTRUCTION OF MATERIEL

11-4. **General.** *a.* Destruction of the Dragon weapon system within the combat zone to prevent enemy capture and use will be on order of the unit commander when he feels such action is necessary in accordance with orders of, or policy established by the Army commander. When possible, the equipment should be evacuated rather than destroyed.

b. If evacuation of the Dragon is not possible, destroy the components with the priority:

(1) Tracker.

(2) Round.

c. Destruction of the Dragon components by mechanical means, explosives, gunfire, or burning, will render them useless to the enemy. The Dragon weapon components should be destroyed as completely as possible to prevent the enemy from obtaining any useful information. When lack of time or personnel prevents total destruction of the Dragon, it is essential that the priority components of the Dragon be destroyed first. Destroying the same components in all weapons will prevent the enemy from assembling a complete Dragon weapon by cannibalizing useful units.

d. Each using organization and installation that uses, maintains, or stores the Dragon, should have an SOP for destruction of the weapon system. The SOP should contain priorities of destruction, methods of destruction, quantities of explosive required, and complete instructions for destroying.

11-5. **Destruction of Dragon Tracker.** The tracker may be destroyed by one of the following methods.

a. Explosive. Prepare and place a double primed explosive charge of at least ½-pound on top of the tracker and fire either electrically or nonelectrically.

See FM 5-25 for information on methods of preparing and detonating charges of explosives.

b. Gunfire. Well-aimed shots from artillery, rockets, tank guns, rifle fire or other small arms fire should be adequate to render the tracker useless to the enemy. When employing small arms fire, aim for critical parts such as the optics, trigger assembly, and electronics package.

c. Mechanical. This method involves smashing the tracker with axes, picks, crowbars, rocks, other components, etc., or driving over it with a tracked vehicle. Destroy it completely if sufficient time and men are available.

d. Burning. After maximum damage has been done to the tracker by other destructive methods, and if time permits, set fire to the resulting debris. Vehicle fuels and lubricants can be used to good advantage for destruction by burning.

11-6. Destruction of the Dragon Round. The Dragon round may be destroyed by the following methods:

a. Launching. The simplest and most effective method of destroying the missile is to fire it int enemy held territory. The launching should be don so that missile detonation hinders the enemy i every possible way without endangering friendl troops or equipment.

b. Explosives. Use of explosives for destructio will not only destroy the missile but the launcher a well. One-half pound of explosive placed on th round close to the warhead should completel destroy the round. See FM 5-25 for information an methods of preparing and detonating charges o explosives.

c. Gunfire. Well-aimed shots from artillery rockets, grenade launchers, or tank guns may b used to destroy the Dragon round.

11-7. Destruction of the Dragon Training Equipment. The destruction procedures for the Dragon training equipment are the same as for the Dragon weapon. Priority of destruction is:

a. Infrared transmitter.

b. Monitoring set.

c. Launch effects trainer.

APPENDIX A

REFERENCES

1. **Army Regulations (AR).**

75-1	Malfunctions Concerning Ammunition and Explosives, Reports Control Symbol AMC-132 (MIN).
380-5	Safeguarding Defense Information.
385-63	Regulations for Firing Ammunition for Training, Target Practice, and Combat.
604-5	Clearance of Personnel for Access to Classified Information and Material.

2. Field Manuals (FM).

5-25	Explosives and Demolitions.
20-60	Battlefield Illumination.
21-6	How to Prepare and Conduct Military Training.
21-26	Map Reading.
21-40	Chemical Biological Radiological, and Nuclear Defense.
23-12	Technique of Fire of the Rifle Squad and Tactical Application.

3. **Technical Manuals (TM).**

9-1000-213-35	DS, GS, and Depot Maintenance Manual for Cannon 105 mm gun M68 Mount, Combination Gun M116 and M140 and Cupola, Tank Commander's Caliber .50 Machinegun, M19 Used on: Tank, Combat, Full tracked: 105 mm Gun M60A1 w/c (2350-756-8497); Tank Combat Full tracked; 105-mm Gun, M60 w/c (2350-678-5773).
9-1300-206	Care Handling, Preservation, and Destruction of Ammunition.
9-2300-224-34	Direct support and general support maintenance manual: Carrier, personnel, full tracked, armored: M113 2350-629-1294 (formerly 2320-629-1294) carrier, command post, light tracked: M577 2350-856-6624 (formerly 2320-856-6624) carrier, mortar, 107-MM, self-propelled: M106 2350-860-2350 carrier, flame thrower, self-propelled: M132 2350-987-8900 recovery vehicle, full tracked, light armored: XM806 2350-808-6119.
9-2320-218-34	DS, GS Maintenance Manual: Truck, Utility: ¼ Ton 4 X 4, M151 (2320-542-4783), M151A1 (2320-763-1092).

4. **Training Circulars (TC).**

21-5-1	Training Management Digest Number One, "Training Management: An Overview."
21-5-2	Training Management Digest Number Two, "Performance-Oriented Training."

APPENDIX B

DRAGON PROGRAM OF INSTRUCTION

B-1. General Subjects. *a.* Introduction to Dragon (Tracker, Missile, Safety) 1 hour

b. Introduction to Training Equipment (Infrared Transmitter Monitoring Set, Launch Effects (Trainer) ..... 1 hour

c. Techniques of Fire (Firing Techniques, Bipod/Tracker Manipulations, Familiarization Table 1). ..... 2 hours

d. PE on Training Equipment (Hands-On Training, Alinement, Infrared Transmitter, Functioning, Launch Effects Trainer Maintenance, Training Equipment Safety) ..... 2 hours

e. Instructional Firing ..... 7 hours

(1) Engagements without M64 - 40

(2) Engagements with M64 - 170

f. Qualification Firing ..... 1.5 hours

Qualification engagements with M64 - 60

g. Familiarization Firing—Prone Position ..... .5 hours

Engagements with M64 - 5

h. Launch Signature Simulator (LSS) Firing ..... .5 hours

Engagements with LSS - 3

j. This program of instruction is primarily used in Advanced Individual Training.

Familiarization Table I

(10 Engagements w/out M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing Position*	*Target Posture*	*Monitor set Range setting*	*Target speed (MPH)*
1	3	Sitting	Stationary	5	0
2	3	Kneeling	Stationary	2	0
3	2	Standing	Stationary	10	0
4	2	Sitting	Moving	5	5

Instructional Firing Table II

(30 Engagements w/out M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing position*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	2	Sitting	Stationary	2	0
2	3	Sitting	Moving	2	10
3	3	Sitting	Moving	10	5
4	4	Kneeling	Stationary	5	0
5	2	Kneeling	Moving	10	5
6	3	Kneeling	Moving	2	5
7	3	Standing	Stationary	10	0
8	2	Standing	Moving	5	5
9	2	Standing	Moving	2	5
10	2	Sitting	Stationary	5	0
11	2	Kneeling	Stationary	2	0
12	1	Standing	Stationary	10	0
13	1	Sitting	Moving	5	5

Instructional Firing Table III

(20 Engagements with M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing position*	*Target posture*	*Monitor set Range setting*	*Target speed (MPH)*
1	2	Standing	Stationary	5	0
2	1	Standing	Moving	10	3
3	3	Sitting	Stationary	5	0
4	2	Sitting	Moving	10	5
5	3	Kneeling	Stationary	5	0
6	3	Kneeling	Moving	10	5
7	3	Kneeling	Moving	10	5
8	3	Kneeling	Moving	10	3

Instructional Firing Table IV

(30 Engagements With M64 Cartridge)
Target range—250 meters

Rd Seq	*No Rd*	*Firing position*	*Target Posture*	*Monitor set Range setting*	*Target speed (MPH)*
1	3	Kneeling	Stationary	5	0
2	3	Kneeling	Moving	5	5
3	3	Kneeling	Moving	2	5
4	3	Sitting	Stationary	10	0
5	3	Sitting	Moving	2	5
6	3	Sitting	Moving	2	20
7	2	Standing	Stationary	2	0
8	2	Standing	Moving	5	5
9	2	Standing	Moving	10	5
10	2	Kneeling	Moving	10	3
11	2	Kneeling	Moving	10	5
12	2	Sitting	Moving	10	5

Instructional Firing Table V

(30 Engagements With M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing position*	*Target posture*	*Monitor set Range setting*	*Target speed (MPH)*
1	2	Standing	Stationary	2	0
2	2	Standing	Stationary	10	0
3	3	Standing	Moving	5	10
4	3	Standing	Moving	5	3
5	3	Sitting	Moving	10	5
6	3	Sitting	Moving	10	3
7	2	Sitting	Moving	2	20
8	3	Kneeling	Stationary	2	0
9	3	Kneeling	Moving	2	5
10	2	Sitting	Moving	10	3
11	4	Sitting	Moving	10	5

Instructional Firing Table VI

(30 Engagements With M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing Position*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	3	Kneeling	Stationary	5	0
2	2	Kneeling	Moving	10	5
3	2	Standing	Stationary	5	0
4	2	Standing	Moving	10	3
5	3	Sitting	Stationary	5	0
6	2	Sitting	Moving	10	5
7	5	Standing	Moving	10	3
8	5	Standing	Moving	10	5
9	4	Sitting	Moving	10	5
10	2	Sitting	Moving	10	3

Instructional Firing Table VII

(30 Engagements With M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing position*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	2	Sitting	Moving	5	3
2	2	Kneeling	Moving	5	5
3	2	Kneeling	Moving	2	10
4	2	Kneeling	Moving	2	5
5	2	Standing	Stationary	10	0
6	2	Standing	Moving	10	5
7	2	Standing	Moving	2	10
8	5	Kneeling	Moving	10	3
9	5	Kneeling	Moving	10	5
10	6	Sitting	Moving	10	3

Instructional Firing Table VIII

(30 Engagements With M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing position*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	10	Sitting	Moving	10	3
2	10	Sitting	Moving	10	5
3	5	Kneeling	Moving	10	3
4	5	Kneeling	Moving	10	5

Familiarization Table IX (Prone)

(5 Engagements With M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing position*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	5	Prone	Stationary	5	0

Qualification Firing Table X

(20 Engagements With M64 Cartridge)
Target Range—250 Meters
Firing Position—Sitting

Rd Seq	*No Rd*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	1	Stationary	2	0
2	2	Moving	2	10
3	3	Moving	5	10
4	2	Stationary	10	0
5	3	Moving	10	3
6	3	Moving	5	5
7	2	Stationary	10	0
8	2	Moving	5	3
9	1	Moving	10	5
10	1	Stationary	5	0

Qualification Firing Table XI

(20 Engagements With M64 Cartridge)
Target Range—250 Meters
Firing Position—Kneeling

Rd Seq	*No Rd*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	2	Stationary	2	0
2	2	Moving	2	10
3	2	Moving	5	5
4	2	Stationary	2	0
5	2	Moving	10	3
6	2	Moving	5	5
7	1	Stationary	10	0
8	2	Moving	10	3
9	2	Moving	10	5
10	1	Stationary	2	0
11	2	Stationary	5	0

Qualification Firing Table XII

(20 Engagements With M64 Cartridge)
Target Range—250 Meters
Firing Position—Standing

Rd Seq	*No Rd*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	2	Moving	2	10
2	3	Moving	2	5
3	1	Stationary	5	0
4	1	Moving	10	5
5	3	Moving	10	3
6	2	Stationary	5	0
7	2	Moving	5	3
8	3	Moving	10	5
9	1	Stationary	10	0
10	1	Stationary	2	0
11	1	Moving	5	5

LSS Familiarization Firing Table XIII

Target Range—250 Meters

Rd Seq	*No Rd*	*Target posture*	*Firing position*	*Monitor set range setting*	*Target speed (MPH)*
1	1	Sitting	Stationary	NA	0
2	1	Kneeling	Moving	NA	5
3	1	Standing	Moving	NA	5

B-2. Dragon Refresher Training Program. *a.* Subjects Covered:

(1) Technique of Fire (Refresher) ..... 5 .5 hour
(2) Refresher Table I ..... 1 hour
(3) Refresher Table II ..... 1 hour
(4) Engagements with M64-40

b. Refresher Training Instructions:

(1) A review of Dragon Techniques of Fire should be administered prior to training.

(2) Refresher training should be conducted every 90 days as a minimum. This time interval was determined as a result of the findings of Retention Testing conducted during the Check/Operational Test of Dragon Training Equipment.

(3) Gunners must achieve 70 percent on Refresher Table I. This table is statistically identical to the 60-Round Qualification Tables fired by gunners in AIT. Therefore, if a score of 70 percent is achieved, gunners can be considered as qualified as they were at the completion of AIT.

(4) Multiple Target Engagement Table II should be conducted using two target vehicles as an optimum. However, one target vehicle can be used with close coordination between the firing line and the vehicle.

(5) Multiple Target Engagement Table II must be conducted using two complete sets of training equipment per student during the actual conduct of the table. One tracker will be used and it must be alined with both sets of Training Equipment to assure accurate hit/miss information after each exercise.

(6) During conduct of Refresher Table II gunners will select their own firing position.

Refresher Table I

(30 Engagements W/M64 Cartridge)
Target Range—250 Meters

Rd Seq	*No Rd*	*Firing Position*	*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	3	Sitting	Stationary	10	0
2	3	Sitting	Moving	10	3
3	3	Sitting	Moving	5	3
4	3	Sitting	Moving	5	10
5	3	Standing	Sationary	5	0
6	3	Standing	Moving	2	5
7	3	Standing	Moving	10	5
8	2	Kneeling	Stationary	2	0
9	4	Kneeling	Moving	5	5
10	3	Kneeling	Stationary	2	0

Note. Gunners must achieve 70 percent hits on this firing table in order to maintain their qualification with the Dragon.

Refresher Table II—Multiple Target Engagements

(10 Engagements W/M64 Cartridge)
Target Range—250 Meters
Firing Position—To Be Selected by Gunner

Rd Seq		*Target posture*	*Monitor set range setting*	*Target speed (MPH)*
1	1	Stationary	2	0
	1	Moving	2	15
2	1	Stationary	10	0
	1	Moving	10	3
3	1	Moving	10	5
	1	Stationary	10	0
4	1	Moving	5	15
	1	Stationary	10	0
5	1	Moving	2	15
	1	Stationary	5	0

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By Order of the Secretary of the Army:

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